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The purpose of this project was to examine the suitability of several Sports Medicine and Rehabilitation Team (SMART) Clinic models. The staff elements required to staff each model was explained and the capacity each model was capable of meeting was identified. The evaluation of each model included accessing the model's ability to meet the increased musculoskeletal treatment demand produced by a military training population. The costs, start-up and operating, for each model was identified so that the implementation cost of each model could be identified and compared. The economic value of the care provided by each model was assigned through the use of Civilian Health and Medical Program Uniform Service (CHAMPUS) maximum allowable charge (CMAC) rates. The most suitable model identified by this project was model 3. Model 3's staff consists of: 1 Sports Medicine Physician, 1 Physical Therapist, 2 Certified Athletic Trainers, 2 Corpsmen, and 1 Administrative Clerk. The clinic is capable of providing up to 1,000 patient visits per month, International Classification of Disease (ICD-9) coded 99202 and 99203 visits, for musculoskeletal injuries or illnesses.

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Submitted to the Program Director in Partial Fulfillment  
of the Requirements for the Degree of Master in Health Care  
Administration  
May 2003

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## Abstract

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## Introduction

The purpose of this study is to offer a Sports Medicine and Rehabilitation Team (SMART) model for the prevention and treatment of musculoskeletal injuries to military populations, specifically Marine Corps units. A SMART Clinic is a multidisciplinary team of providers and staff operating in a single location to treat a given population's musculoskeletal or athletic injuries. The role of a SMART Clinic is to provide early diagnosis, intervention and treatment of injuries and to manage rehabilitation to minimize the effects of injuries on training. A SMART Clinic allows health care leaders, clinicians, and training staff to implement strategies to prevent musculoskeletal injuries from occurring within their population. The co-location of the health care staff to an area proximal to the training sites allows for superior communication among providers, as well as other workplace synergies that can improve the delivery of musculoskeletal care.

The use of sports medicine approaches to treat musculoskeletal injuries is not a new phenomenon; in fact the method has documented successes in numerous settings for decades. Many athletic programs, typically high school, college or professional sports teams, have relied upon sports medicine practitioners to prevent and treat their athletes. The sports

medicine approach has aided athletic programs in achieving a higher level of competitiveness as well as lowering the injury rates among the athletes. The successes these programs have achieved provide the basis for their suitability to provide similar results for the military population.

Military training is physically demanding and, thus, the risk of experiencing a musculoskeletal injury is high. Marine Corps training courses are among the most physically demanding of all military training. The training is very comparable to the most strenuous of civilian occupations or athletic programs. Considering the enhanced performance that many athletic teams have enjoyed because of their athletic programs, implementation of a military SMART Clinic provides a promising opportunity to prevent and manage injuries seems promising. Establishing a SMART Clinic to support Marine Corps units, as well as other military populations, has potential to enhance training, improve unit readiness, and lower overall medical care costs. Reduction of musculoskeletal injuries and, thereby decreasing medically related discharges due to musculoskeletal injury are two key benefits of a sports medicine program initiative.

Musculoskeletal injuries are the most frequent injury types that military populations experience. The costs associated with these injuries are significant. In fact, 78% of all medical

discharges from the Marine Corp's Officer Candidate School over the last 3 years were a direct result of musculoskeletal injuries. Musculoskeletal injuries are those conditions coded as International Classification of Disease (ICD-9) codes 710 through 739.9 and musculoskeletal illnesses are those coded as ICD-9 codes 810 through 848.9.

Recruiting and processing of military members is very expensive. The processes that involve attracting, identifying, testing, interviewing, and evaluating interested recruits is not only labor intensive, but very costly. The 2001 Department of Defense study, called the Morale and Quality of Life Study, found that it costs \$11,600 to recruit one person into the military (Department of Defense, 2001). As evidenced in Figure 1, the costs to recruit have experienced a 200% increase over the last decade. Additional expenses that are not reflected in the DoD study include travel to the duty location and medical care necessary to bring the recruit up to physical standard. The operating costs of the school, teaching staff salary and other costs associated with the training are strong financial incentives to maximize the output of the training schools.

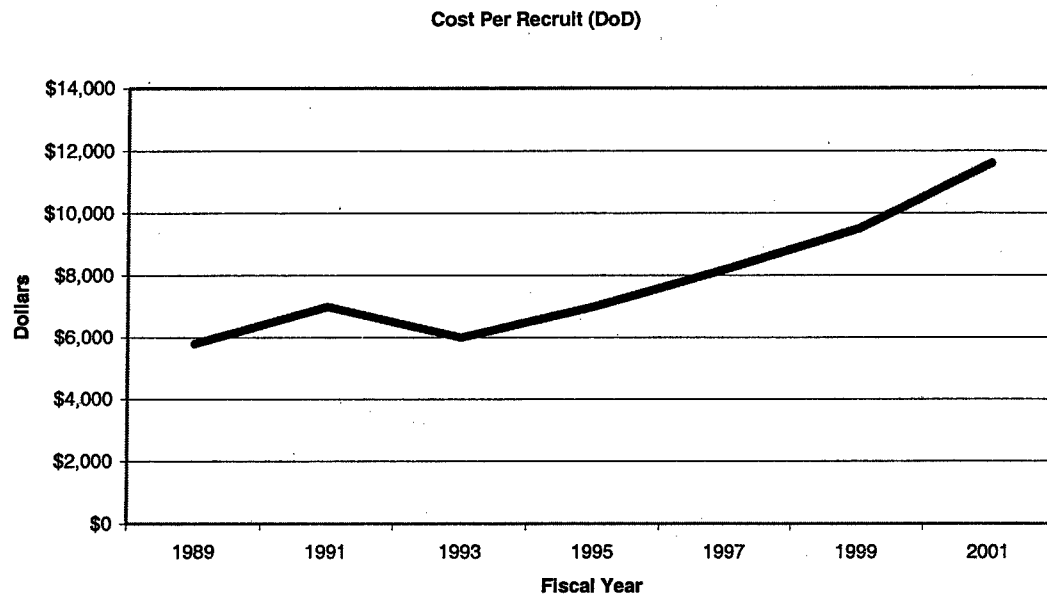


Figure 1. Average cost per recruit into the Department of Defense Armed Services.

The SMART Clinic concept will rely on the same treatment modalities and techniques that professional sports teams utilize to treat and rehabilitate their athletes. The health care goal of the SMART Clinic is to protect military members from permanent injury while providing early treatment to injuries that enables most students to return to training immediately. The SMART Clinic also has potential to lower musculoskeletal injuries and training loss by focusing on injury prevention efforts. The ability to rapidly diagnose musculoskeletal injuries or illnesses and initiate proactive measures to safeguard the student are not only vital contributions of the

SMART Clinic concept, but are crucial to reducing costs, preventing long term injury, and decreasing injury related discharges.

Identification or development of a clinic structure capable of educating, treating and rehabilitating a transient military population is the key first step in establishing a SMART Clinic. Additional considerations that must be determined in the early planning stages are facility size and physical location. The underlying objectives of this project are to provide a better understanding of the need for concentrated musculoskeletal care, discuss the staff composition of the clinic staffing and to identify a clinical model that is best suited to meet the musculoskeletal health care demands of a military training population.

#### Conditions, which prompted the study

As previously stated, Marine Corps training programs are rigorous and can be comparable to professional athletic training programs, particularly in terms of intensity. During physical training, specifically Marine recruit and Officer Candidate School training, it is not uncommon for an injury to occur. In most cases the injury will involve the musculoskeletal system. Once an injury has occurred, it is critical that prompt medical treatments by trained professionals with associated resources

are readily available to initiate diagnosis and treatment. The proximity of medical personnel and resources to the training site greatly enhances a rapid diagnosis of the injury and may minimize the risk of long-term harm to the Marine. Although aggressive training directly supports the Marine Corp's need for a physically strong and agile force, it also could hamper readiness, as many injuries create lost duty days for the service member and his or her unit. Lost duty days for new recruits impact moral of the member, their unit and are costly to productivity; however the loss of a qualified, experienced Marine can be devastating to unit readiness. Additionally, the personal loss to a seriously injured Marine would be life altering. He or she may face separation from the service as a result of long-term rehabilitation needs or permanent disabilities suffered from the injury.

The Marine Corps has recognized the cost of musculoskeletal injuries to the Corps and is seeking initiatives to prevent or reduce injuries. To combat the negative effects of training injuries, the Marine Corps has developed the Sports Medicine and Injury Prevention (SMIP) initiative. Reductions of injury risk, rapid injury detection, and assurance that initial treatment resources are available are the major goals of the SMIP initiative. The focus of the SMIP is the primary prevention of

injuries, however the initiative would provide benefits to both secondary and tertiary prevention areas.

The first major objective, which is already underway, is to build a computer database to collect data from each injury occurrence. Data collected will be useful to Marine Corps leaders interested in forecasting future injury rates and analyzing injury trends. This insight will allow for development of injury prevention strategies directed at those activities which pose increased risk of injury. The information will allow school leaders and training commands to be empowered to evaluate the benefit of the training against the injury risk and make adjustments where possible to maximize training benefits and minimize injuries.

The SMIP initiative will be comprised of an athletic training room located near the training site and be staffed with Certified Athletic Trainers (ATC) to assist in emphasizing prevention, education and treatment of musculoskeletal injuries. It is anticipated that the ATCs will align their operations with the SMART Clinic to facilitate prompt and appropriate care and rehabilitation efforts for injured personnel.

Observation of the SMIP initiative will be limited to a 27-month test period beginning in 2002. The initiative will begin with pilot test implementation at six Marine Corps training

sites. Once the 27-month period ends and a performance assessment of the overall impact of the SMIP initiative is conducted a decision will be made whether or not to implement the initiative Marine Corps wide. The implementation of the SMART Clinic is the next logical interface for the SMIP on the treatment pathway. The SMART Clinic's efforts will compliment and enhance the SMIP initiative effort to reduce, treat and prevent musculoskeletal injuries.

#### Statement of the problem or question

The U.S. Navy has committed to establish and operate SMART Clinics at the 6 training sites to support the Marine initiative. The Navy plan dictates that the SMART Clinic will be located separate from the Military Treatment Facility (MTF). However, the local MTF will be responsible for providing the resources and staff to support the SMART clinic. The preferred location for the SMART Clinic is as close as possible to the Marine training site it supports. Staffing at the SMART Clinic will include those health care providers that primarily treat musculoskeletal injuries, and will include, at a minimum, Sports Medicine Provider, Physical Therapist, Certified Athletic Trainers. Other and other health care staff will be assigned as necessary.

The major question this project is intends to answer is:

"What is the SMART Clinic structure needed to meet the musculoskeletal treatment demands of a high risk military population?"

#### Literature Review

Recently, the Bureau of Labor Statistics published a comprehensive study called Lost-Work Time Injuries and Illnesses: Characteristics and Resulting Time Away From Work, 2000, which found that 40% of the injuries that resulted in lost time from work were sprains or strains, most frequently affecting the back. The study also identified that 4 of the top 5 occupational injuries that involved lost time from work in 2000 were musculoskeletal injuries (BLS 2002).

The National Institute for Occupational Safety and Health (NIOSH) conducted a similar study of occupational injuries to identify the top ten work related diseases and injuries. The study identified musculoskeletal injuries as the leading cause of disabilities for workers with almost 50% of the workforce affected at some point in their working life. Musculoskeletal injuries were identified as the leading cause of workers' compensation and the injuries were the most significant health problem to affect a workers quality of life (Centers for Disease Control and Prevention, 1991).

The American Academy of Orthopedic Surgeon's study, Musculoskeletal Conditions in the United States (1988), estimated that the total cost of musculoskeletal conditions in the United States was approximately \$126 billion in 1988 alone, with musculoskeletal injuries accounting for \$26.1 billion of the total cost. Sprains and strains were the largest portion of musculoskeletal injuries, (48% for females and 41% for males). Fractures and dislocations accounted for 11% of male injuries and 7% of female injuries (American Academy of Orthopedic Surgeons, 1992).

The physical demands of Marine Corps training are high, likely much more demanding than most civilian occupations. Early injury detection and treatment are critical steps in returning Marine "athletes" to training and safeguarding them from inflicting permanent damage from continued performance of an injured area of the body. Conti (1994) stressed the importance of early injury recognition in preventing irreversible damage from a musculoskeletal injury. The extremely high degree of motivation that exists in these students often convinces them to not seek care for fear of missing a required course of instruction. These factors can create situations where the injury becomes much worse and ultimately, when the Marine does seek treatment, the condition

is such that they are no longer medically qualified to return to the duty. Again, these are primary benefits of the SMART Clinic concept; treatment is convenient and assessable to the students; and care is rapid and directed at quickly returning trainees to their course of instruction. The result will be reduced attrition rate for the school, as well as lowering the permanent injury risk for the Marine.

Often, the most significant hurdle for Navy Military Treatment Facilities (MTFs) is encouraging the Marines to seek care in the initial stages of the injury. Poole (1997) found that athletes can and do often continue their performance without treatment of a musculoskeletal injury. Musculoskeletal injuries, unlike other types of injuries, allow the athlete to defer immediate treatment and continue training. As mentioned, it is common for Marines in training to continue their performance while suffering from a significant musculoskeletal injury. Poole's study found that if musculoskeletal injuries are not properly treated and rehabilitated when they occur, the athlete would face an increased risk of reinjury to the affected area (Poole, 1997).

Once a patient seeks access to treatment at the SMART Clinic, the clinic must be equipped with experienced and trained health care providers to properly detection, diagnosis and

treatment of training injuries. Smith and Laskowski (1998) advised that physicians and allied medical staff with specialized training in sports medicine were best suited to perform musculoskeletal evaluations and treatment. The study also discussed continuity of care and the importance of proper rehabilitation techniques to reduce the long-term effects of a musculoskeletal injury. The also highlighted the importance of a patient's comprehensive medical history and the preliminary physical in effectively treating and prevention of musculoskeletal injuries.

Several studies noted that for the Sports Medicine and Rehabilitation Team (SMART) Clinic to be successful, it must be established and operated as a multidisciplinary team. Janisse (1994) noted the importance of a team approach not only to treat the immediate injury, but also to increase the likelihood of preventing future injuries. The importance of teamwork cannot be overstated and it provides for the development of workplace synergies that will positively benefit patient outcomes.

#### Purpose

The purpose of this project is to discuss the need for the implementation of a sports medicine approach to musculoskeletal injury prevention and treatment. This project will identify four versions of the SMART Clinic concept that have potential to

meet the musculoskeletal health care demands of a military training population. The ability to meet: the health care demand of the student population, the administrative burdens of the Military Health System, and the Joint Commission on Accreditation of Health Care Organization's accreditation requirements will be the selection criteria used to identify the best model. The ultimate goal of the SMART Clinic is to conserve fighting strength by reducing lost training time, reducing musculoskeletal injury rates and training attrition.

#### Methods and procedures

Prior to developing the most appropriate organizational structure the SMART Clinic would need to operate under, was necessary to evaluate a "snapshot" of the musculoskeletal injuries that military training environments produce. Thus, the identification of injury trends was conducted. Next, it was necessary to relate those injuries to the health care disciplines, including both providers and support personnel that should comprise the SMART Clinic staff. Finally, this project sought to identify and discuss four individual models including the determination of their suitability for operation within the military health care environment.

## Injury Data

Each of the military Services provides rigorous, physically demanding training courses of instructions to their personnel. These courses range from maintenance of state of the art electronic systems to instruction on basic infantry skills. The individual course requirements, exercises and activities, shape the physical risk each student will face during the training. In obvious terms, increased physical activity contributes to an increased risk of injury, thereby resulting in more injuries. The Marine Corps is home to some of the most physically demanding military training that exists.

Marine Corps Base Quantico is one of the Corp's highest profile training bases. Two of the toughest Marine Corps courses are located there: Officer Candidate School (OCS) and The Basic School (TBS). Each of these schools provides unique challenges to students. OCS is the indoctrination and basic training point for most Marine Corps Officers, while TBS is the basic infantry skills instruction that all Marine Officers must complete. The aggressive training that occurs at Quantico, make the student population at that location an excellent sample from which to gather insight into the types and frequency of musculoskeletal injuries that military training can create.

Officer Candidate School is a 10-week course designed to evaluate, screen and develop students to become rifle platoon leaders in the Marine Corps. Some students qualify to complete a two 6-week course in lieu of the 10-week course. The two 6-week courses are typically completed by college recruits that perform one 6-week course in their junior year, return to college, and then complete the second 6 week course upon graduation. The Officer Candidate School has a seasonal pattern of students with the largest student level being during the summer months. Student levels range from approximately 260 during the fall and winter months and peak at approximately 1500 in the summer months. Appendix A contains the student levels for OCS from October 2000 through September 2002.

The training curriculum of OCS tends to cause a significant amount of musculoskeletal injuries that result in medical discharges. Because the students arrive from the civilian sector, the majority are normally not in adequate physical conditioning to meet the intense exercise demands of the first few days of training, thus injuries are more frequent. The course includes a very physically demanding obstacle course test and an 11-mile march completed during a 36-hour nonstop small unit leadership evaluation module. In addition to these requirements, the students are required to march and run for

long periods of time in combat boots throughout the 10 weeks.

The stress inflicted with combat boots versus that of running shoes increases the risk of injury to the lower leg and foot.

The Basic School is a very physically demanding six-month course. The course consists of 1563 total hours of instruction, 60% in classroom settings and 40% in a field-training environment. Field training exposes the students to an increased risk of injury, as many exercises take place during hours of darkness and over rough terrain. The Basic School has a relatively stable student attendance, ranging from a low of 650 and a peak of 900 students. Despite the aggressive training, the attrition due to medical injury is not significant. This may be due to the better physical condition of the students upon their arrival at the course.

Given the number above and that the total student population the proposed SMART Clinic would target could range from a low of 900 to a high of 2500, the proposed model would have sufficient capacity to handle both the TBS and OCS classes. Appendix A and B contain specific class size for OCS and TBS for fiscal year 2002. The training in each of the courses is a standard curriculum and the musculoskeletal injury rate per person should be consistent, however the number of injured will vary with class size. Additionally Appendix C reveals the

cyclic nature of the student levels. The summer months have a significantly higher student level than the remainder of the training year. Higher student levels and the extreme seasonal heat are likely to produce an increased demand on the clinic.

The students at OCS and TBS made 4904 clinical visits for medical care during fiscal year 2002. "BARI" and "BARJ" were the specific Medical Expense Performance Reporting System (MEPRS) codes used to document the sports medicine clinical visits for these students in the Composite Health Care Computer System (CHCS). During fiscal year 2002, students at these schools made 4904 clinical visits for sports medicine related care. Examination of the clinical data revealed that 3971 (80.97%) visits were for musculoskeletal illnesses and 294 (6%) were for musculoskeletal injuries. To further identify the specific diagnoses these students were assigned, I.C.D.9 Tabular Coding was used. Table X below contains the specific breakdown of the visits under the I.C.D.9 tabular list. In order to identify the musculoskeletal injuries from all other injuries, it was necessary to subdivide the Injury and poisoning tabular list into two distinct groups. Musculoskeletal illnesses were those coded from 710 through 739. Diagnoses were separated into Musculoskeletal Injuries, (codes 800 through 848.9), and Other Injuries, (codes 850 through 999). Musculoskeletal injuries

and illnesses comprised 87% of the clinical visits for the student population. Additionally, the table reflects that 10.48% of these visits had insufficient data entry quality to determine the nature of the visit.

Table 1

Clinic Visits by International Classification of Disease's Tabular List (N= 4904)

Description	Range	OCS	N%	TBS	N%	Total	N%
Infectious/Parasitic Disease	001-139	0	--	0	--	0	--
Neoplasm	140-239	1	0.06%	3	0.09%	4	0.08%
Endocrine/Metabolic, Etc.	240-279	10	0.63%	0	--	10	0.20%
Blood/Blood Forming	280-289	0	--	0	--	0	--
Mental Disorders	290-319	4	0.25%	2	0.06%	6	0.12%
Nerve/Sensory	320-289	10	0.63%	6	0.18%	16	0.33%
Circulatory System	380-459	0	--	0	--	0	--
Respiratory	460-519	9	0.57%	7	0.21%	16	0.33%
Digestive System	520-579	1	0.06%	0	--	1	0.02%
Genitourinary System	580-629	4	0.25%	0	--	4	0.08%
Pregnancy/Childbirth	630-677	0	--	0	--	0	--
Skin/Subcutaneous	680-709	9	0.57%	22	0.66%	31	0.63%
Musculoskeletal	710-739	873	55.08%	3098	93.34%	3971	80.97%
Congenital Anomalies	740-759	1	0.06%	0	--	1	0.02%
Perinatal Problems	760-779	0	--	0	--	0	--
Ill-Defined Conditions	780-799	9	0.57%	1	0.03%	10	0.20%
Musculoskeletal Injuries	800-848	224	14.13%	70	2.11%	294	6.00%
Other Injuries	850-999	21	1.32%	5	0.15%	26	0.53%
Unknown/Incomplete Data	850-999	409	25.80%	105	3.16%	514	10.48%
		1585	100.00%	3319	100.00%	4904	100.00%

As emphasized above, one of the primary benefits of the SMART Clinic is the realization of lower training attrition and/or medical discharges from training due to medical injuries. The overall attrition rate for TBS is very low, (less than 1%), with medical reasons only a portion of that total. Unfortunately, TBS could not provide detailed records to allow

for closer examination of each individual discharge. OCS, on the other hand had a significant medical attrition rate of approximately 6.65%. Musculoskeletal injuries and illnesses comprised the bulk of OCS discharges with a total of 77% directly related to medical issues. Appendix E contains a graphical depiction of the medical reason noted by the school for the student's dismissal from the course.

Over the last 3 years, (October 2000 through September 2002), 319 OCS students were discharged from training due to injury or illness. Table 2 identifies the general nature of the medical problem that resulted in the removal from training. Musculoskeletal injuries were responsible for approximately 247 or 78% of these medical discharges.

Table 2

Officer Candidate School Medical Discharges by Reason From Oct. 2000 Through Sept. 2002 (N = 319)

Major Medical Reason	OCS <sup>1</sup>	N%	PLC <sup>2</sup>	N%	PLC-C <sup>3</sup>	N%	Total	N%
Adjustment/Psych	13	7.83%	4	3.03%	3	14.29%	20	6.27%
Cardiac Conditions	4	2.41%	0	--	0	--	4	1.25%
Gastrointestinal	5	3.01%	3	2.27%	0	0.00%	8	2.51%
Heat Related	4	2.41%	10	7.58%	0	0.00%	14	4.39%
Musculoskeletal	127	76.51%	104	78.79%	16	76.19%	247	77.43%
Other Conditions	8	4.82%	9	6.82%	2	9.52%	19	5.96%
Viral Episodes	5	3.01%	2	1.52%	0	--	7	2.19%
	166	100.00%	132	100.00%	21	100.00%	319	100.00%

Note. OCS<sup>1</sup> = Officer Candidate School Course, PLC<sup>2</sup> = Platoon Leader Course,

PLC-C<sup>3</sup> = Platoon Leader Course - Combined.

To further compound the problem, the majority of musculoskeletal injuries that require discharge occurred after the first two weeks of training. The later the injury occurs during training, the more costly the discharge is to the Marine Corps. In other words, as each week passes, the Marine Corps has spent additional time and funds to train the student. If a discharge is necessary the expense has an "accrued" impact. Table 3 contains the medical discharges by week of training for the 6 and 10-week OCS training courses. Week 0 signifies any medical issue identified at the in-processing medical evaluation.

Table 3

Medical Discharge by Week for Officer Candidate School Courses

Week	6 Week Course		10 Week Course	
	Total	Musculoskeletal	Total	Musculoskeletal
0 (In processing)	33	24 (72.73%)	3	0 (0%)
1	35	22 (62.86%)	16	7 (43.75%)
2	62	55 (88.71%)	26	17 (65.38%)
3	20	19 (95.00%)	23	17 (73.91%)
4	19	14 (73.68%)	21	18 (85.71%)
5	16	14 (87.50%)	15	12 (80.00%)
6	9	8 (88.89%)	8	7 (87.50%)
7	--	--	5	5 (100.00%)
8	--	--	5	5 (100.00%)
9	--	--	3	2 (66.67%)
10	--	--	0	0 (0%)
Total	194	156 (80.41%)	125	90 (72.00%)

Table 3 denotes the total discharges by week and further identifies the musculoskeletal portion of the total. The data

reveals that the musculoskeletal percentage of the total discharge rate is much higher in the later weeks of the training.

Quantico's data highlights the negative impact musculoskeletal injuries and illnesses have on military training. The information also reveals that, over the course of training, students face higher risk of medical discharge from musculoskeletal injury than any other medical reason.

#### Health Care Providers and Staff

The SMART Clinic concept relies on the skills of a multidisciplinary team to be effective. Sports Medicine Physicians, Physical Therapists, Certified Athletic Trainers, and Corpsmen are the disciplines that will comprise the SMART Clinic staff for the models provided in this study. A brief summary of each of the health care disciplines that will be part of the SMART Clinic is provided below.

According to the Bureau of Labor Statistics, a Sports Medicine Physician is a physician that has completed specialty training in sports medicine or has gained experience in treating patients for sports medicine related injuries. The educational requirements for physicians are lengthy: 4 years of undergraduate school, 4 years of medical school, and 3 to 8 years of residency and internship. Licensure is required for

physicians in all states. Graduation from an accredited medical school, passing the licensing examination, and completion of 1 to 7 years of graduate medical education are minimum requirements. Physicians desiring board certification in a specialty should expect to spend additional years in training (length depends on specialty in residency training chosen). For board certification by the American Board of Medical Specialists or the American Osteopathic Association, the physician must pass a final examination after residency or shortly after 1 or 2 years of practice (Bureau of Labor Statistics, 2002).

The American Medical Association describes the Physician Assistant as one who is academically and clinically trained to practice medicine with the direction and responsible supervision of a licensed physician. Educational programs to obtain credentials as a Physician Assistant range from 2 to 4 years and offer a competency-based accredited curriculum. Each of the 50 U.S. states regulates the Physician Assistant practice and each requires a supervising physician (American Medical Association, 2003).

According to the American Medical Association, Physical Therapists are health care professionals that work with a broad range of patients to help improve injured patients' strength and mobility, reduce pain, and minimize the risk of permanent

disability. Physical Therapy requires close contact with the patient and communication skills are critical to enable the therapist to instruct and educate the patient in treatment as well as injury prevention. The Commission on Accreditation in Physical Therapy accredits Physical Therapy programs. Recent changes have raised the minimum requirements from a baccalaureate degree level to a graduate degree as a minimum for entry into the profession. Physical Therapist must pass a state administered national exam upon completion of an accredited physical therapy program (American Medical Association, 2003).

The American Medical Association describes the Certified Athletic Trainer as one who, with the consultation and supervision of attending/consulting physician, provides a variety of services associated with physical activity and sports. A baccalaureate degree is the minimum educational requirement, with graduate programs an additional 2 years. Currently, 41 states have some form of regulatory oversight of athletic trainers. Certification requires passing a written exam in addition to completion of a certified program to obtain Board Certification (American Medical Association, 2003).

The U.S. Navy rating of Independent Duty Corpsman encompasses training in advanced patient care, medical

administration, and logistics. The training prepares enlisted Hospital Corpsman to function independently of a medical officer while stationed in isolated locations. Educational requirements are completion of the 9-month Surface Force Independent Duty Corpsman School in San Diego, CA. Over the 250 training days, students receive training in areas such as medical diagnosis and treatment, preventive medicine, and patient administration (C. J. Fischer, 1997).

The duties of an Information or Administrative Clerk are broad. According to the U.S. Department of Labor, clerks most often manage customers, operate basic office machinery, answer telephone calls, maintain records, and other general administrative duties. In addition to these activities, a clerk is increasingly required to become proficient in computer software and data entry processes. Education requirements vary with the specific job description. However, the minimum educational requirement is a high school diploma (Bureau of Labor Statistics, 2002).

#### SMART Models

The following models are proposed to allow comparisons to determine suitability to meet the musculoskeletal health care needs of a military training population. The models range from a collegiate sports medicine program to that of the traditional

Military Treatment Facility approach. For purposes of this project, the SMART Clinic should have the capacity to process up to 1,000 visits per month.

#### Model 1

The basis for Model 1 is a NCAA Division I College's sports medicine program. The similar age and health between college athletes and Marine Corps students provides a good comparison for the selection of a college sports medicine program. The liberal use of Certified Athletic Trainers in the college model provides a much different approach than that of a traditional Military Treatment Facility.

Contact was made with the Sports Medicine Director at Georgia Tech, Mr. Jay Shoop, to inquire about the design and composition of that school's program. Georgia Tech's program has approximately 400 student athletes that receive year-round sports medicine related care. The athletes are treated both during the given sports season and during off-season training periods for injuries, exercise, diet, and nutrition education (J. Shoop, personal communication, March 12, 2003).

The goal of care at Georgia Tech is to sustain a high level of competitiveness in collegiate sporting events, treat sports related injuries and minimize the risk of long-

term physical impairment. As the graph depicts, the staff consists of 2 Sports Medicine Physicians, 6 Certified Athletic Trainers, 4 Certified Graduate students, and 6 undergraduate student trainers. When the need arises for Orthopedic, Podiatry, or other specialty care, the patient will be referred to providers in the local community.



Figure 2. Staffing model for sports medicine program,  
Georgia Tech, Model 1.

The population served by the sports medicine program is relatively stable. Many athletes are on 4-year athletic scholarships. Each year, roughly 25% of the population will change (seniors leave and freshmen arrive). This stability allows the program to educate the athletes in injury prevention, diet and exercise. The relationships developed over these years enables the trainers to learn more about

the individual athlete's physical strengths and weaknesses. Along with the athlete's medical history, these insights can dramatically enhance the injury prevention ability of the sports medicine program. The fact that the individual sports are seasonal and the population is relatively stable allows the trainers to focus on the high-risk individuals and the peak activity time periods. No specific data was available concerning visits per month.

The strengths of this model are that it has multiple providers, a robust number of Certified Athletic Trainers, and the learning environment to maximize the effects of health education and injury prevention initiatives. Although the lack of Physical Therapist involvement may limit the rehabilitation expertise for some injuries, the large number of Athletic Trainers, including the student trainers, provides the program with the ability to aggressively pursue injury prevention strategies. The compliment of student trainers adds a significant degree of flexibility to the program and enhances the Certified Athletic Trainers results.

It is important to note that the approach to training is slightly different between a college program and the Marine Corps. A college is interested in their athletes'

current health and their ability to participate in the sports program for a given period. Injuries that occur to a Marine on Active Duty have life long implications for both the Marine Corps and the individual. For the Corps, these are costs, readiness, Morale and force structure implications; for an individual, an injury may result in lost duty and even a lost career. Therefore, the Marine Corps focus is more comparable to a long-term investment.

#### Model 2

Years of discussion and numerous Musculoskeletal Care Conferences conducted by the U.S. Navy's Bureau of Medicine and Surgery have generated Model 2. The significant cost of musculoskeletal injuries has challenged Navy health care leaders for many years. Appendices P and Q contain correspondence that initiated the idea of Navy sports medicine in the early 1990s. Despite the interest of Navy leaders the initiative did not move forward due to the turbulent realignment efforts that began to occur in the early 1990s.

Discussions resumed in early 2001 to design and implement a SMART Clinic concept. The approach of treating Marines as athletes was the cornerstone of the initiative. Reduction of injuries, rapid treatment capability and minimization of

the long-term risk of musculoskeletal injuries were some of the potential benefits envisioned from establishing a SMART Clinic.

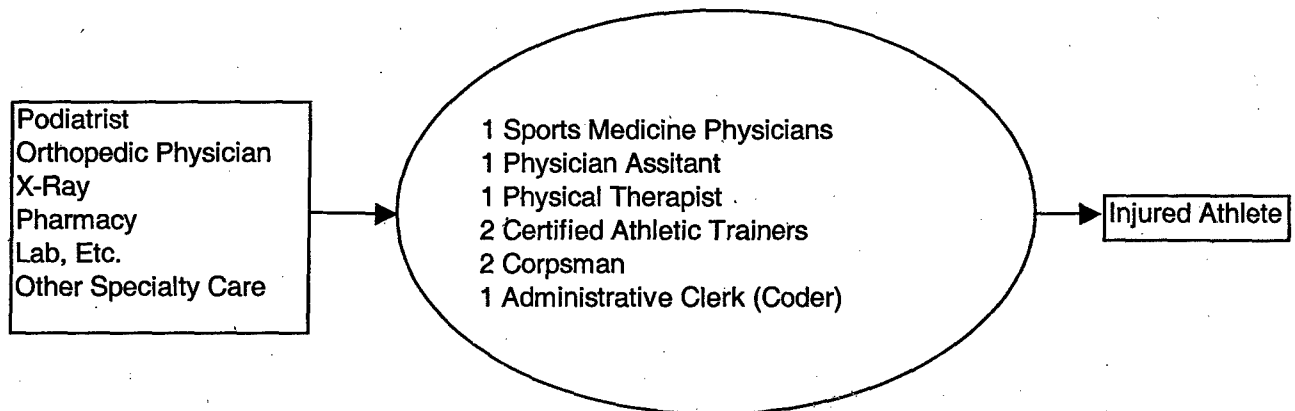


Figure 3. Theoretical sports medicine staffing model to support a military training population, Model 2.

Staffing in Model 2 consists of: 1 Sports Medicine Physician, 1 Physical Therapist, 1 Physician Assistant, 1 Podiatrist, and 6 support staff. Support staff would most likely be 2 Certified Athletic Trainers, 2 Corpsmen, and 1 Administrative Clerk. The assumption is that the 10 person SMART Clinic could provide services for approximately 1,100 patient visits per month or 13,000 patient visits per year. The ratio of patient visits to full time employee for the Navy model is 1300 annual patient visits per full time

employee. To simplify the model comparison in this project Model 2 the model will not include a Podiatrist. This change may bring the Navy model close to the 1,000 patient visits per month level established earlier.

The population served by a Navy SMART Clinic would depend on the nature of the local commands. For purposes of this project, the population would be Marines undergoing aggressive training. The frequent turnover of students will increase the demand for health care and create a much less stable population as compared to Model 1. The first few weeks of Marine Corps training courses are typically the most physically demanding, as many of the students are not physically prepared or conditioned to meet the challenges of the rigorous pace required. The combat gear, frequent running and obstacle courses inherent to the training tend to create an increased frequency of musculoskeletal injuries during the first few weeks of training.

Model 2 is staffed with one Physician Assistant to assist the physician in diagnosing and treating musculoskeletal injuries. The addition of a second provider adds flexibility to the model and directly supports the efforts of the physician. Physicians Assistants (PAs) can provide diagnostic, therapeutic, and preventative healthcare

services under the supervision of a physician (American Medical Association, 2003). Additionally, in most cases, the PA can prescribe medications to patients.

One Physical Therapist is included in the staffing profile to aid patients in restoring function, reducing pain, and lowering risk of permanent physical limitations from musculoskeletal injuries. The Physical Therapists skills are intently focused on the patient after the injury has occurred. Within the SMART Clinic, it is critical that the Physical Therapists and Certified Athletic Trainers work closely together to rehabilitate the patient from the injured state to a full return work.

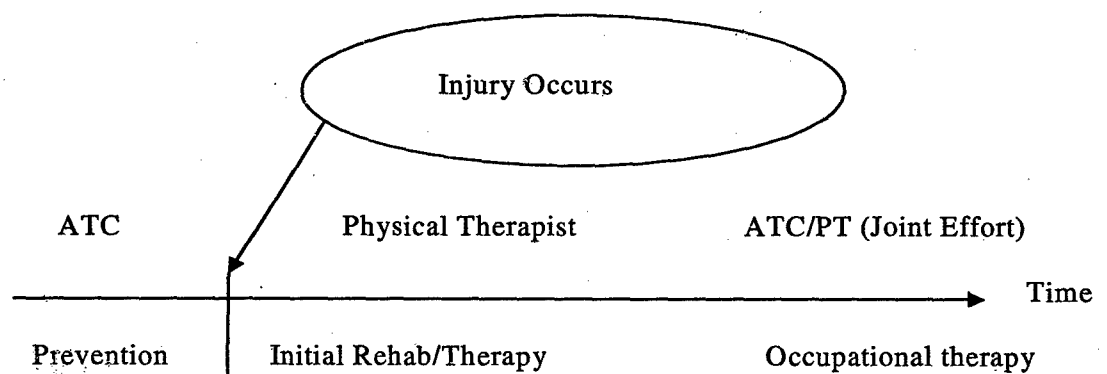


Figure 4. Illustration of key intervention points for Physical Therapists and Certified Athletic Trainers in relation to the occurrence of an injury.

Two Certified Athletic Trainers (ATC) are included in the staffing to assist in injury prevention, provide immediate treatment and rehabilitation of traumatic injuries.

Figure 4 depicts the key points of participation for the Athletic Trainers and the Physical Therapists. The model was developed during discussions with Lieutenant Colonel Todd Dombroski; the U.S. Army Surgeon General's consultant for Sports Medicine (T. Dombroski, personal communication, February 18, 2003). However, it is important to note that this depiction is not mutually exclusive: Physical Therapists can aid in injury prevention and Athletic Trainers can perform rehabilitation modalities (American Medical Association, 2003).

The SMART Clinic is staffed with two Corpsmen to assist the providers and trainers in coordinating patient care and throughput as well as performing administrative tasks necessary to keep the clinic running efficiently.

One Administrative Clerk is included in the staffing to perform a wide range of administrative activities. The clerk could perform duties such as answering telephone calls, scheduling appointments, filing records, and other routine office tasks. However, the clerk may be most useful

performing the clinic's coding of medical encounters. The importance of proper coding and data entry has steadily increased in recent years and is likely to continue to be critically important (Department of Labor, 2002). The total staff for the 2<sup>nd</sup> SMART Clinic model suggests seven and the treatment population is 1,000 patient visits per month.

Orthopedic, Podiatry, and other specialty care will be provided by referrals to the local Military Treatment Facility. In most cases, the local MTF will provide the X-Ray, Pharmacy and Laboratory services to SMART Clinic patients. This approach allows the SMART Clinic staff to focus on musculoskeletal injuries and directs patients to the MTF for additional medical services outside the scope of treatment capabilities of the clinic. The SMART Clinic will screen students for such services with the intent to reduce the demand and minimize unwarranted X-Rays thereby allowing those limited resources and personnel to focus on those patients that need the service.

The strengths of this model are; multiple providers; the mix of Physical Therapist and Certified Athletic Trainers; the ample support staff allocation and the Administrative Clerk assignment. Having more than one provider adds flexibility to the clinic and can provide

consistent service during periods when one provider is on vacation or at off-site professional training conferences. In cases when significant risk exists and professional judgment is needed, the availability of another provider's experience and expertise can provide immeasurable benefit to the decision maker in the form of consultative capacity.

The administrative staff member will provide assistance in areas such as patient scheduling, filing, and maintenance of patient records. Additionally, the importance of data quality and documentation of activities inherent in today's health care environment suggest addition of this staff member will be a valued asset. As an example, the quality of the data presented from Quantico revealed that over 10% of the cases could not be properly assigned to a particularly disease group.

### Model 3

Model 3 is a theoretical model for consideration as a potential approach for a SMART Clinic to provide musculoskeletal treatments in support of Marine Corp training course students. The complete staff in the model is: 1 Sports Medicine Physician, 1 Physical Therapist, 2 Certified Athletic Trainers, 2 Corpsmen, and 1 Administrative Clerk. The model adopts the sports medicine approach by including a Sports Medicine Physician and

Certified Athletic Trainers. The paradigm shift in philosophy to treating Marines as athletes is the foundation of this model.



Figure 5. Theoretical sports medicine staffing model to support a military training population, Model 3.

The goal of the model is the same as other models: prevention of injuries, rapid treatment of injured, and minimization of long-term disability of musculoskeletal injuries. The assumption is that the 7 person SMART Clinic could provide services for approximately 1,000 patient visits per month or 12,000 patient visits per year. The ratio of patient visits to full time employee for this theoretical model is approximately 1,400 annual patient visits per full time employee.

The population size the clinic could target for musculoskeletal services for would depend on the injury

rates and nature of training of the local commands.

Aggressive training and frequent influx of individuals in less than good physical condition could increase the injury rate, raise the demands for the clinic and reduce the overall population size the clinic could reasonably service.

The strengths of this model are the mix of Physical Therapist and Certified Athletic Trainers, the ample support staff allocation and the inclusion of an Administrative Clerk. The only difference between Model 2 and Model 3 is the lack of a Physician Assistant. The major advantage this proposal has over Model 2 is the cost savings of one provider salary and the square footage needed for the office and treatment area a Physician Assistant would need.

The multidisciplinary nature of the SMART Clinic requires a true team approach. It is critical that staff members coordinate care and share expertise in a manner that is in the best interest of the patients. This Model clearly places the Sports Medicine Physician as the team leader for the clinics activities, and as a result, places the patient in the "hub" of the wheel of clinical treatment.

#### Model 4

Each military service has a program to train and employ Sports Medicine Physicians within their respective

systems. However, the overall number and availability of these highly trained providers is small. The traditional Military Treatment Facility staffing mix is the basis for Model 4. Typically, the MTF has a Primary Care Physician, in some cases a Sports Medicine Physician, and a Physical Therapist. In most cases, the physician makes a diagnosis that refers the patient to seek physical therapy. Subsequently, the Physical Therapist provides the oversight of the rehabilitation and the therapy needed to return maximum range of motion and strength to the patient.

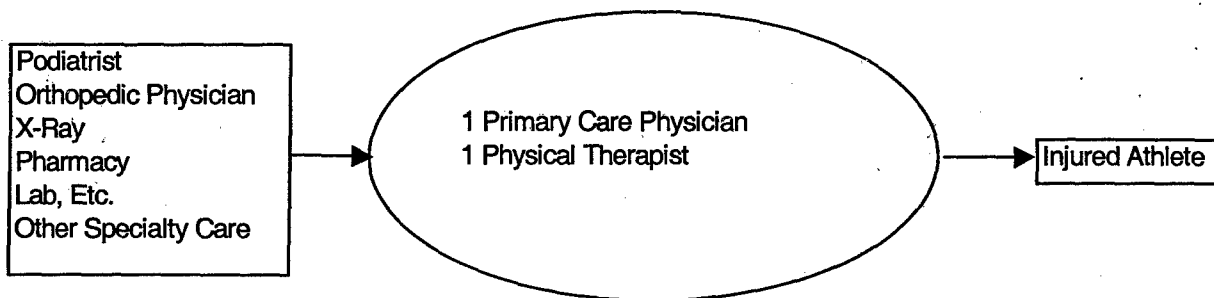


Figure 6. Staffing model of typical Military Treatment Facility sports medicine clinic, Model 4.

The Model consists of 1 primary Care Physician and 1 Physical Therapist. The Physician and Therapist typically work in the traditional MTF workspace. The Military Treatment Facility provides the Sports Medicine Clinic's

administrative support, such as filing, appointment scheduling, and other office related tasks. When specialty care is needed, the patient is referred to other providers or clinics in the Military Treatment Facility. Unlike Model 2, this proposed model is not exclusive to the diagnosis and treatment of musculoskeletal injuries.

The productivity of the Physician and Therapist could provide care for nearly 1,000 patient visits, assuming each treated 4 patients per hour (Current Procedural Terminology Codes 99201 and 99202), 6 hours per day for approximately 21 days per month. However, with a limited staff the clinic would not be about to provide care for 1,000 patients at the Current Procedural Terminology Evaluation and Management Codes of 99203, 99204, or 99205. A 99203-coded visit is an appointment for a new patient that requires a detailed history, a detailed examination, and medical decision making of low complexity. Normally the presenting problem will be of moderate severity. A physician typically spends 30 minutes performing a 99203-coded visit. For 99204 and 99205 coded visits the physician will spend 45 and 60 minutes with each patient respectively. The increase in severity will allow this staff model to perform 500 clinical visits per

month at the 99203 codes and lower level (American Medical Association, 2002).

The strength of this model is that it is already in operation and, in most locations; nothing would be required to change in order to implement. The low number of personnel required to staff this would be less expensive in terms of salary dollars and square footage needs. However, the fact that musculoskeletal injuries significantly hamper training efforts suggests this approach may not be sufficient to meet the demand. Any cyclic demand would prove challenging for only two staff members. The limited window of opportunity that exists for treatment of students without disrupting their training would render this approach less beneficial in reducing lost training time. Additionally, the opportunity to fully document and properly code musculoskeletal injuries would be challenging without additional administrative staff support.

#### Business Case Analysis

In order to determine the value of care provided and the return on the investment of SMART Clinics, projected business case analyses for the clinic's operation are required. The clinic is an on-base installation treating active duty patients and therefore will not generate bills or revenues for the care

provided. Several key assumptions are required to fully examine the potential value of the care a SMART Clinic is capable of providing.

The first assumption is that the ICD-9 codes for the reporting of evaluation and management services provided in the physician's office, outpatient care, are sufficient to represent the type of visits the SMART Clinic will perform. The specific ICD-9 codes used in this model are 99201 through 99205.

Evaluation and management code 99201 is assigned for visits that typically involve a straightforward medical decision and, on average, in which the physician will spend 10 minutes with the patient. ICD-9 code 99202 is more labor intensive in terms of physician effort than 99201 and results in the provider spending 20 minutes with each patient. The ICD-9 codes 99203 and 99204 require progressively more effort in patient history evaluation, examination and the medical decision requires more complexity, the physician typically spends 30 minutes (99203) and 45 minutes (99204) with the patient. The ICD-9 code 99205 is concerned with conducting a comprehensive patient history, a comprehensive examination, and the medical decision-making is highly complex. The physician typically spends 60 minutes with the patient. Nearly all of the patient visits at the SMART Clinic should be

within the description of codes 99202 and 99203 (American Medical Association, 2002).

The next assumption is that each model, with the exception of model 4, will operate at a 750 patient visit per month level. Model 4 will operate at a 500 patient visits, (evaluation and management 99203 coded visit or lower), per month. These visits will be an equal distribution of 99202 and 99203 ICD-9 evaluation and management coded visits. The Civilian Health and Medical Program Uniform Service (CHAMPUS) maximum allowable charge rate (CMAC) rate, the rate paid to a civilian provider, in most cases, for these visit types is \$59 and \$88 respectively as found at <http://www.tricare.osd.mil/cmac/>. These rates reflect the CMAC charge for these specific visits in the Quantico, Virginia area and may vary based on zip code. Based on the reimbursement of \$59 (99202) and \$88 (99203) the value assigned for the projected visits for the business case analysis will be the average of these, or \$73.50 for each model, unless noted elsewhere.

Another assumption is that an ICD-9 code 99202 and 99203 captures the typical visit for the SMART Clinic. The assignment of these codes covers the cost of all procedures and gives an estimate of the values of care provided.

The five-year projections developed for the business case analysis also include estimates for growth in volume and reimbursement. A 2% volume growth rate in visits is assumed in years 2 and 3, and no growth is projected to years 4 and 5. Reimbursement growth and inflation rates are assumed to increase at a constant 3% annually over the 5-year projection.

More detailed information on the business case analysis for the models analyzed in this project is provided in Appendices H through Appendix O. The estimates replicate two different size clinics, a 1350 square foot facility for models 1 through 3 and an 800 square foot facility for model 4. The larger staff size of models 1 through 3 will require more square footage than model 4, which has only a two person staff.

#### Model 1

The capital investment for model 1 is \$91,000. The annual salary cost for model 1 is \$506,900. The 750 patient visits per month represent a provider workload rate of 17.5 patient visits per 8 hour day, five days per week. This factor allows for the provider to spend 27 minutes with each patient. A best case scenario rate of 1,000 patient visits per month would represent a provider's workload rate of 23 patient visits per day with only 20 minutes allowed per patient visit.

Model 1's net income will average \$64,195 annually over the five-year period. This represents a return on investment of 70% within the first year with a payback period of the initial investment of \$91,000. Additionally, if the clinic were to perform at a best case scenario rate of 1,000 patient visits per month the average net income would be \$280,991 and the return on investment would be 308% within the first year.

#### Model 2

The capital investment for model 2 is \$102,680. The annual salary cost for model 2 is \$408,000. The 750 patient visits per month represent a provider workload rate of 11.5 patient visits per 8 hour day, five days per week. This factor allows for the provider to spend 41 minutes with each patient. A best case scenario rate of 1,000 patient visits per month would represent a provider's workload rate of 15.5 patient visits per day with only 31 minutes allowed per patient visit.

Model 2's net income will average \$133,645 annually over the five-year period. This represents a return on investment of 130% within the first year with a payback period of the initial investment of \$102,680. Additionally, if the clinic were to perform at a best-case scenario rate

of 1,000 patient visits per month the average net income would be \$350,440 and the return on investment would be 341% within the first year.

### Model 3

The capital investment for model 3 is \$102,680. The annual salary cost for model 3 is \$345,000. The 750 patient visits per month represent a provider workload rate of 17.5 patient visits per 8 hour day, five days per week. This factor allows for the provider to spend 27 minutes with each patient. A best case scenario rate of 1,000 patient visits per month would represent a provider's workload rate of 23 patient visits per day with only 20 minutes allowed per patient visit.

Model 3's net income will average \$206,766 annually over the five-year period. This represents a return on investment of 201% within the first year with a payback period of the initial investment of \$102,680. Additionally, if the clinic were to perform at a best-case scenario rate of 1,000 patient visits per month the average net income would be \$423,561 and the return on investment would be 413% within the first year.

Model 4

The capital investment for model 4 is \$72,254. The annual salary cost for model 4 is \$164,000. The 500 patient visits per month represent a provider workload rate of 11.6 patient visits per 8 hour day, five days per week. This factor allows for the provider to spend 41 minutes with each patient. A best case scenario rate of 1,000 patient visits per month would represent a provider's workload rate of 23 patient visits per day with only 20 minutes allowed per patient visit.

Model 4's net income will average \$237,709 annually over the five-year period. This represents a return on investment of 324% within the first year with a payback period of the initial investment of \$72,254. Additionally, if the clinic were to perform at a best case scenario rate of 1,000 patient visits per month the average net income would be \$756,837 and the return on investment would be 1033% within the first year.

Other Considerations

During the course of this project, several issues were identified that are worthy of mention when considering the development of a SMART Clinic. Communications, physical

location of the clinic, and clinic size are key issues that directly affect the operation of the SMART Clinic.

Communication between the SMART Clinic staff is vital to the success of the clinic. Bringing the sports medicine providers and staff into a single location enhances communication and cooperation to allow rapid treatment of the injured. Open communication allows providers to closely monitor a patient's progress throughout the treatment stages. Patients are less likely to receive conflicting information concerning their treatment or condition if providers are communicating with one another. Noble, Porter, Bachman, Fagan, and Hoover (1982) stressed the importance of a communication link between sports medicine professionals and the patient. Glasgow, Terborg, Hollis, Severson, and Boles (1995) Work Site Wellness study noted the importance of communication and information sharing among the groups developing and managing programs relating to workplace health. The SMART Clinic concept, design, in any of the proposed models, will establish a framework to enable development of a cohesive sports medicine team with strong communication links both up and down the treatment pathway.

The physical location of the SMART Clinic is very important to the overall success. The clinic should be located as close as possible to the patient's work environment, i.e., where the

injuries are most likely to occur. The close proximity aids the clinic in its mission in at least two important ways. First, it places the Athletic Trainers in a position to gain insight into the daily activities of the patient population and allows them to perform tasks that may lessen the likelihood or severity of injury prior to a risky event (taping an ankle prior to a basketball game). Second, a close location will reduce the time needed to get an injured patient to the SMART Clinic for treatment. This could be very important if the injury is severe or life threatening. This reduced travel time will continue to benefit the patients when follow-up care or therapy is required. The more convenient the care is to the patient the more likely they are to meet appointment times, shorten their recovery period, and reduce the time away from class or training. The physical separation from the MTF allows the clinic staff to focus the personnel and resources on the primary goal of the clinic.

Selection of the site to establish the SMART Clinic is very important to the clinic's success. In order for the clinic to detect and treat injuries earlier, patients must visit the clinic soon after an injury occurs. Co-locating the clinic in proximity to the training site will make the clinic more accessible and convenient to the patient, and should encourage

them to seek care earlier. Studies have shown the importance of location in contributing to successful workplace health initiatives (Noble, et al (1982), Glasgow, et al (1995)). This is particularly important for the Athletic Trainer, who is the first line of contact for most of the injuries the SMART Clinic will treat. The ability to monitor daily activities can assist the Athletic Trainer in developing injury prevention strategies that will reduce the overall injury rate. The physical location of the clinic closer to the patients will also serve to enhance the verbal interactions between providers, patients and the training command.

The SMART Clinic will need adequate space to provide treatment to most patients in a fiscally responsible manner. It is likely that demand will vary during the day, with the highest patient volume presenting in the early morning prior to the start of training activities. When planning the square footage needs, it is important to identify the maximum number of patients that will be under a treatment modality in the facility at any given time.

According to Rankin and Ingersoll (2001), the identification of treatment areas and specific equipment for the facility can make the effort to determine square footage need less daunting. These authors suggest allocating 2 or 3 square

feet for every person under treatment. Space occupied by equipment should not be counted for the space allocation. Secor (1984) offers a mathematical formula, below; to project square footage needs for a Sports Medicine Facility (Rankin & Ingersoll, 2001):

(# of patients at peak time/20 tables per day) X 100 square feet

Assuming the SMART Clinic received 1,000 patient visits per month with peak periods being 16 patients in a given treatment area at any given time. Secor's formula would suggest the minimum square footage for the work area to be 80 square feet (16 Patients/20 Tables per Day X 100 Square Feet = 80 Square Feet). The area must be unoccupied floor space and the 80 square feet is a minimum starting point from which to plan (Secor, 1984).

Rankin and Ingersoll's space allocation method suggests a minimum of (3 square feet X 16 patients) 48 square feet for the same work area. As can be seen in this example the two methods differ in the square footage estimate. This process would need to be completed for each treatment area individually and then tabulated to determine the overall square footage needs of the facility. Careful consideration of the space needed for the

equipment and its operation must be given when determining the minimum square footage needs (Rankin & Ingersoll, 2001).

### Conclusions

The majority of injuries that occur during military training are musculoskeletal. The frequency and severity of these injuries require exploration of new and innovative ways to improve the delivery of health care to military populations to lower costs and improve health outcomes. The added education available to the patients via the Sports Medicine Physician is very important in diagnosing, treating and reducing sports related injuries. The models discussed as part of this article highlighted the potential benefit of a sports medicine approach. Model 3 provides the best organizational structure to treat a population that produces 1,000 patient visits per month for musculoskeletal treatments. Model 3's ability to provide ample staff and resources to meet 1,000 patient visits, coded 99202 and 99203, at the lowest possible cost is the primary reason for its selection. Specifically, Model 3 provides all of the services of Model 2; however the additional staff, Physician Assistant, increases the cost by approximately \$80,000 annually.

The addition of an Administrative Clerk to perform the coding duties is a major improvement to the current system that should provide significant benefits in improving data quality

and documentation of daily activities. Effective communications among providers and staff, adequate space and a convenient physical location are three key elements that must be determined in the earliest developmental stages.

Poor data quality hampered many aspects of this research project. The data quality of the information gathered as part of this project suggests that clinics are not completely recording their activities and may in fact be prone to underreporting their activities. On over 10% of the cases examined the very nature of the illness or injury could not be determined. These points indicate that the current level of data quality is not sufficient for informed decisions. Proper documentation, particularly accurate coding, is critical for proper oversight and management of the clinic. The addition of an Administrative Clerk has the potential to improve the quality of data produced by the SMART Clinic. A busy physician, not supported by a certified coder, can be significantly challenged to treat patients properly as well as allocating sufficient time to accurately code and review all of the clinics activities.

Assignment of two enlisted members to the SMART Clinic enables specific training in the duties that provide the most support to the clinic to occur. This is much more beneficial

than a number of different enlisted members frequently rotating in an out of the clinic as support.

The business case analyses performed as part of this project identified an estimate of the value of care a SMART Clinic is capable of providing. Using the value estimate developed to evaluate the individual models it became apparent that model 3 provided the most suitable method to implement. The flexibility model 3 has over model 4, the current approach at most locations, has potential to dramatically change the health care approach to musculoskeletal injuries. The ability to provide education, training and pre-injury treatment will be invaluable in preventing injuries from occurring as well as lowering the overall loss of personnel due to musculoskeletal injuries.

Model 3 has a rapid return on investment time period and a rich value of care produced projection and is therefore the most beneficial model.

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Appendix A. Student Population Level at Officer Candidate  
School From October 2000 Through September 2002.

<u>Class</u>	<u>Length (wks)</u>	<u>Students</u>	<u>NPQ*</u>	<u>Musculoskeletal</u>
OCC-175	10.0	256	31	16
OCC-176	10.0	223	18	15
OCC-177	10.0	696	21	16
1st INC	6.0	651	27	23
2nd INC	6.0	601	28	22
OCC-178	10.0	272	27	23
OCC-179	10.0	293	28	21
OCC-180	10.0	492	62	52
1st INC	6.0	683	27	23
<u>2nd INC</u>	<u>6.0</u>	<u>628</u>	<u>50</u>	<u>39</u>
Total	N/A	4795	319	247

\*NPQ is Not Physically Qualified, students removed from training  
for medical reasons

Appendix B. Student Population Level at The Basic School

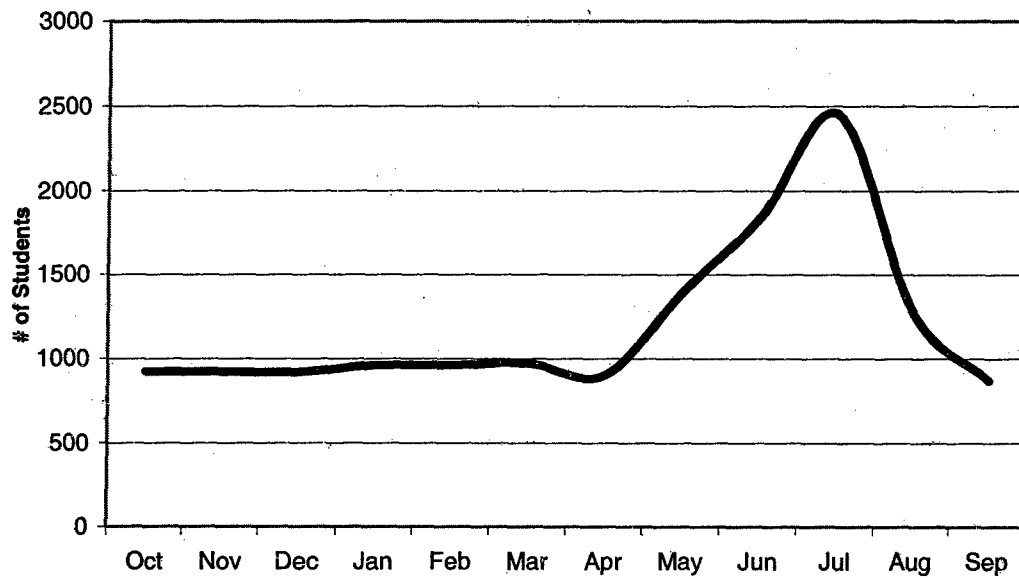
From October 2000 Through September 2002.

## The Basic School

<u>Class</u>	<u>Length (wks)</u>	<u>Students</u>
Alpha Co	26	211
Bravo Co	26	235
Charlie Co	26	221
Delta Co	26	212
Echo Co	26	216
Foxtrot Co	26	223
<u>India Co</u>	<u>12</u>	<u>235</u>
Total	N/A	1553

Appendix C. Total Student Population for Officer Candidate School and The Basic School From October 2000 Through September 2002.

Student Population (OCS & TBS, FY 2002)



Appendix D. Medical Discharge Data for Officer Candidate  
School Students From October 2000 Through September 2002

Fall 2000

<u>Date of Birth</u>	<u>Sex</u>	<u>Week of Training</u>	<u>Medical Reason</u>
720601	M	1	Adjustment Disorder Psych
730616	M	3	Small Bowel Obstruction/Surgery
770908	M	1	Left Foot Pain
721018	M	4	Shin Splints
760519	M	2	Bi-Lateral Knee Pain
711107	F	5	Stress Fractures
761006	M	1	Psychological
780525	F	3	Sprained Ankle
720223	F	2	Right Foot and Ankle
761230	M	1	Adjustment Disorder
721030	M	2	Enlarged Heart
770723	M	6	Broken Toe
731024	M	2	Lateral Knee Pain
780531	M	2	Asthma
750728	M	1	Cardiac Problem - Serious Nature
761120	M	3	Left Hand Injury
720625	M	2	Hemiscrotal Hematoma
760723	M	8	Wrist Fracture
720709	M	1	Psychological
750502	M	5	Stress Fractures
780513	M	0	Head Injury

751111	M	4	Shin Splints
731014	M	9	Psychological
741017	M	1	Psychological
670714	F	5	Distal Tibia Stress Fracture
691121	M	5	Respiratory Infection
740609	M	4	Tibial Confussion
770319	F	5	Psychological
761121	M	2	Adjustment Disorder
741010	M	3	Bilateral Shin Splints and Stress FX
710416	M	7	Pubic Ramus Fracture

## WINTER 2001

<u>DOB</u>	<u>SEX</u>	<u>WK</u>	<u>REASON</u>
770618	M	0	Femur Stress Fracture
691121	M	1	Elbow Injury
740424	M	3	Left Leg Edema
720128	M	4	Stress Fracture
750106	M	3	Right Knee Problem
740827	M	4	Left Femoral Stress Changes
770521	M	4	Bilatera Shin Pain
780406	M	2	Edema to Legs
760423	M	8	Bilateral Femoral Pain
740128	M	3	Stress Fractures
751110	M	5	Peds Caves
780528	M	4	Stress Fractures
731223	M	4	Testicular Edema

760808	M	3	Shin Splints
780925	M	5	Brachial Plexus Injury
780928	M	2	Anxiety Disorder
730712	M	7	Orthopedic (Evident)
741110	M	2	Anxiety Disorder

## SUMMER 2001/1st INC

DOB	SEX	WK	REASON
830910	M	4	Stress FX
830401	F	1	Anxiety Disorder/Drug OD
810910	M	4	Left Inguinal Hernia
Unknown	M	2	Dislocated Shoulder
Unknown	M	1	Hydrocele/Epididimitis
820408	F	3	Bilatet PFS/Poss Right SFX
820913	F	1	Grief, Self Harm Threat
820203	M	1	Bilate Plantar Fascitis
810415	F	1	PFS
771105	M	2	ACL Tear
820926	F	2	Right Hip Strain
800415	M	2	2X Ankle Sprained
811214	F	2	Ankle Sprain
810404	M	1	Cellulitis
Unknown	M	3	PFS
Unknown	M	4	Post-Concussive Syndrome
820416	M	0	Testicular Epididimitis
820902	F	2	Ankle Sprain, Hip Pain

811218	M	5	Cellulitis, Pyuria
790714	M	3	Foot Fracture
810120	M	3	Shin Splints/Possible Stress FX
820730	F	4	Shin Splints/Possible Stress FX
810926	F	2	Left Shoulder
770327	M	4	Achilles Bursitis
800507	M	2	Left Ankle Sprain
810514	M	1	Anterior Tibial Pain
790601	M	4	Left Tibia Stress Fracture

## SUMMER 2001/2nd INC

DOB	SEX	WK	REASON
820718	M	2	RhabDomyolysis
820422	M	4	Right Metatarsal
801031	M	4	Left Foot Fracture
790607	F	3	Left Knee Pain
810116	M	2	Wisdom Teeth
761209	M	1	Possible Lat Meniscus Tear
820315	M	2	Right Radius/Unlar Fracture
800319	M	1	Allergies
800408	M	3	Right Knee Pain
800722	M	1	Right Plantar Fascitis
810506	M	1	Dental, Abscess
810720	M	2	Post Concussive Syndrome
820522	M	1	Heat Exhaustion
800216	M	2	Right Lateral Knee Injury

820604	M	1	Right Metatarsal Stress FX
781012	M	2	Cellulitis/Shin Splints
800819	M	3	Bilatera; Metatarsalgia
810928	M	1	Post Concussive Syndrome
820711	M	3	Left Heel Pain
800205	M	2	Ankle Injury
771119	M	2	Twisted Left Knee
800312	M	2	Left Shoulder Injury
800929	M	2	Injured Right Shoulder
810611	M	0	Heatstroke
800622	F	5	Right Leg Fracture
810523	M	2	Grade II Ankle Sprain
811010	M	1	SWOLLEN L KNEE
811118	M	2	Muscular Strain

OCC-177 Total

DOB	SEX	WK	REASON
751112	M	4	3rd Metacarpal Fracture
741011	M	0	Adjustment Disorder/Depression
800724	M	1	PFS/Possible Meniscus Tear
771118	M	6	Back Pain
721130	M	7	Left Foot Fracture
780609	M	1	Concussion
770116	M	2	Tendonitis of Knee
721101	M	4	Left Ankle Sprain
770401	M	2	Right Hip Flexor Strain

770412	M	3	Dislocated Shoulders
760103	M	4	Left Tibia Fracture
791002	M	3	Adjustment Disorder
810729	M	2	DBL Ankle Sprains
800514	M	2	Required Wisdom Teeth Extraction
810816	M	6	Left Hip Pain
750410	M	4	Ankle Sprains (Pre-Exist)
771031	M	4	Epididymitis
730412	M	4	Left Femoral Stress Fracture
800210	M	7	Shoulder Subluxation
780615	M	1	Adjustment Disorder/Alcohol
770909	M	4	Right Ankle/Left Knee Pain

## FALL 2001

DOB	SEX	WK	REASON
750831	M	2	Right Trapezius Spasm
720227	M	1	Right Side Inguinal Hernia
761126	M	1	Left Knee Pain
730517	M	5	Left Tibia Stress Fractures
690728	M	1	Right Side Cervical Pain/Radiculopathy
770228	M	2	Left Knee Overuse Injury
790403	F	5	Distal Coccygeal/Sacral Dislocation/FX
781212	M	2	Right Knee ACL Tear
700204	M	1	Left Knee Pain

781009	F	2	Bilateral Foot/Right Shin Pain
770604	F	2	Contusion Right Leg/Right Hip Pain
730927	F	3	Bilateral Ankle Spasm, Contusion, Shin Splints
740416	M	5	Left Tibia Stress Fracture/Right Ankle Sprain
690430	F	2	Bilateral Shin Splints
770501	F	5	Right Sacroiliac Discomfort
750814	F	6	Left Tibia Stress Fracture
711225	M	2	Heat Exhaustion/Dehydration
720321	M	1	Left Tibia Pain
731203	M	4	Viral Labyrinthitis/Nausea/Dizziness
740809	M	6	Multiple Stress Fractures
791014	F	5	Compression Fracture of L1
750111	F	4	Tibia Stress Fractures
731025	M	9	Right Mid-Shaft Tibia Fracture
720111	M	4	Cellulitis/Blisters
760829	M	3	Right Foot Acute Cellulitis
780104	M	5	Left Tibia Stress Fracture
781214	F	7	Multiple Stress Fractures of Left Lower Extremity

WINTER 2001 OCC-179

DOB	SEX	WK	REASON
780317	M	3	Right Knee Pain/Right Shin Splints
760123	M	3	Syncope Adjustment
720407	M	3	Bilateral Medial Knee Pain

750123	M	3	Bilateral Foot Pain and Swelling
761008	M	3	Loss of depth Perception/Astigmatism
771204	M	6	Mononucleosis
790128	M	3	Bilateral Shin Splints
710812	M	5	Right Foot and Ankle Pain
730228	M	6	Stress Fracture
730804	M	6	Left Hip Pain
730429	M	9	Left Hip or Pelvic Stress Fracture
750303	M	2	Hypertension
770819	M	2	Right Hip and Knee Pain
761006	M	3	Multiple Left Ankle Sprains
740714	M	3	Left knee Pain, PES Anserine Bursitis
740810	M	3	Bilateral Shin Splints
771127	M	2	Left Foot Metatarsal Fracture/Knee Pain
771125	M	5	Acute Anxiety Attacks/Psychological
780823	M	2	Bilateral Shin Splints
720727	M	3	Dyspnea/Heart Block Type I
790914	M	8	Left Tibia Stress Fracture
760325	M	2	Psychological
760526	M	8	Right Hip Pain
800722	M	3	Leg, Knee and Back Pain
761016	M	4	Left Arm Injury
750830	M	8	Right Hip and Pelvis Pain
790220	M	4	Right Shoulder Subluxation

771008 M 4 Right ACL Tear

## SUMMER 2002/1STINC

DOB	SEX	WK	REASON
760623	M	0	Lower Back Pain
800928	F	1	Blunt Trauma to Right Patella Tendon
820610	M	0	Heat
810605	M	0	Fracture of Right 4 <sup>th</sup> Metatarsal
751204	M	0	left Shoulder Strain
810508	M	1	2 Heat Cases in 9 Days
790627	M	3	Stress Fracture Right Femur Mid-Diaphysis
820806	F	2	Bilateral PES Cavus
770328	M	1	Bilateral Shin Pain
780929	F	2	Overuse Injuries of Bilateral Lower Extremities
830224	M	0	Left Knee Pain
801123	M	2	Fractured 3 <sup>rd</sup> Metatarsal
800927	M	2	Right Distal Radius Fracture
820129	F	0	Right Femoral Head Fracture
760522	M	0	Sprained Ankle
811129	M	1	2 Times Heat Case
830417	M	2	Right 3 <sup>rd</sup> /4 <sup>th</sup> Metatarsal Fractures
811216	M	0	Left Ankle Sprain
830801	M	2	Right 4 <sup>th</sup> Metatarsal Stress Fracture
820618	M	1	Right Patellofemoral Pain

810722	M	2	Recurrent Right Shoulder Dislocation
801215	M	2	Right Patellar Tendonitis, Right Achilles Tendonitis
810630	M	2	2 <sup>nd</sup> Digit Left Foot Fracture
791205	M	0	Psychological/Adjustment Disorder
781202	M	0	Right Knee Pain (Patello Femoral Syndrome)
830211	F	1	Bilateral Shin Pain, Left Knee Strain
830326	M	3	Leg and Knee Pain

## SUMMER 2002/2ND INC

DOB	SEX	WK	REASON
801003	M	0	Headaches
810717	F	3	Right Patellar Subluxation
750406	M	0	Right Knee ACL Tear
780917	M	3	Multiple Fractures and Eroded Blisters, Left Foot
780829	M	2	Iliotibial Band Syndrome
820115	M	4	Acute Respiratory Distress Syndrome/Pneumonia
830110	M	2	Left Upper Arm Discomfort/C6 Nerve
790413	M	0	Left Ankle Instability
801009	M	3	Left Iliotibial Band Syndrome
791031	M	0	Fractured Heel

730705	M	0	Right Knee Tear
790126	M	2	Stress Fracture Right Foot 2 <sup>nd</sup> Metatarsal
751213	M	0	Pinched Nerve, Neck
740227	M	0	Back Strain
800812	M	0	Shin Splints
810806	M	2	Bilateral Compartment Syndrome
801011	M	0	Asthma
831203	M	0	Shin Stress Fracture
830103	M	0	Left Knee Pain
810131	M	3	Right Shoulder/Multidirectional Instability
780111	M	2	Left Foot Edema
790401	M	2	Bilateral Shin Splints
810210	M	0	Stress Fracture, Both Shins
810824	M	4	Stress Fracture Right 3 <sup>rd</sup> Metatarsal
830403	M	1	Wisdom Teeth
810716	M	2	Chronic Low back Pain
790322	M	2	Heat
800430	M	0	Left ACL Tear
800321	M	3	Metatarsalgia Due to Hammer Toes
801029	M	0	Heat
830104	M	1	Left Knee Pain
801106	F	1	Right Iliotibial Band Syndrome
731023	M	1	Left Foot and Leg Pain
800124	M	1	Left Medial Meniscus Damage

821014	M	1	Inability to Adjust Due to Mental Health
800414	M	2	Pneumonia
801219	M	2	Two Fractures in Left Foot
820706	M	2	Left Tibial Stress Fracture
811216	M	4	Right Knee Patella Contusion
750628	M	0	ACL Tear
830111	M	2	Small Bowel Obstruction/Surgery
800623	M	2	Left Shoulder Dislocation
810206	M	0	Heat
830428	M	0	Tennis Elbow
790216	M	0	Back and hip Pain
791010	M	0	Shin Splints
820123	M	3	Right 4 <sup>th</sup> Metatarsal Stress Fracture
800513	M	2	Tibial Fracture, Needs Surgery
761005	M	0	Expired Physical
810422	M	1	Right Knee Pain

## SUMMER 2002/OCC 180

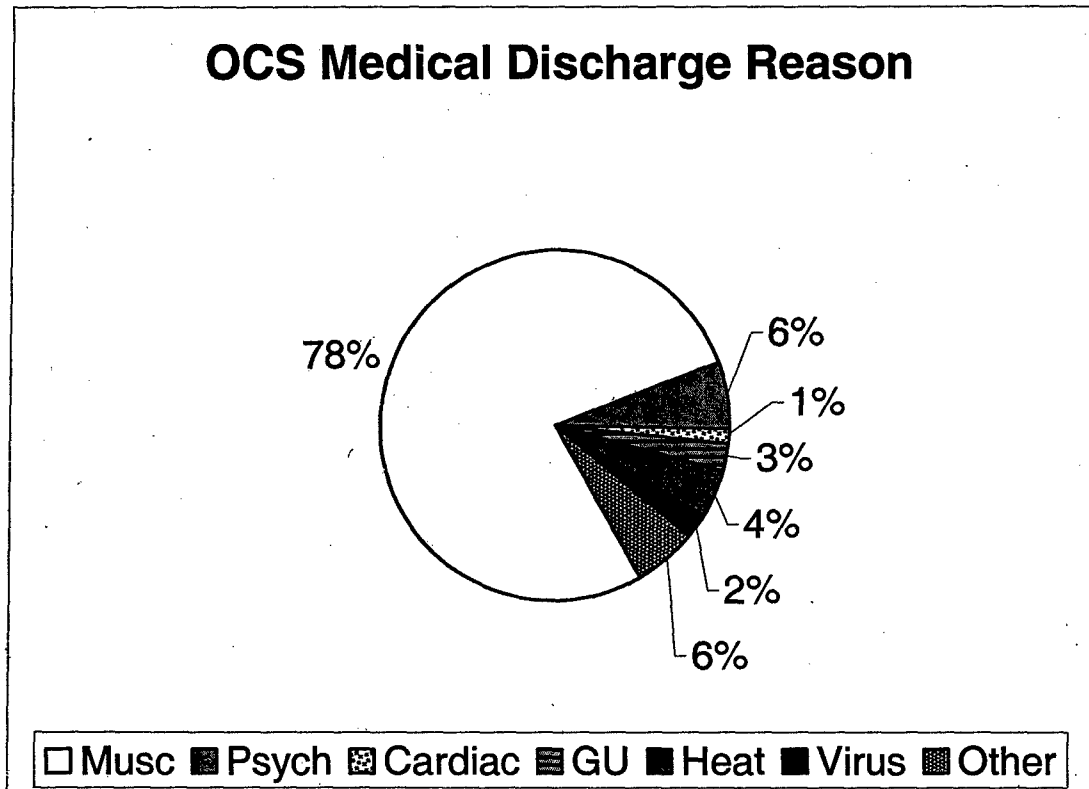
DOB	SEX	WK	REASON
800802	M	4	Patello Femoral Syndrome, Patellar Tendonitis
791125	M	7	Bilateral Plantar Fasciitis
820226	M	2	Left IT Band Syndrome
811227	F	6	Left Foot Pain
730512	M	5	Bilateral Foot Pain/Stress Fracture

801010	F	5	Right Tibia Stress Fracture
750827	M	5	Left Mid Fibula Stress Fracture
800331	M	5	Pneumonia
730704	M	1	Bilateral Knee Pain
81518	F	6	Right Knee Patellofemoral Syndrome
731211	M	2	Right Ankle Inversions
720708	M	3	Multiple Overuse Injuries, Shin Splints
791029	M	2	Bilateral heel Pain
790926	F	2	Stress Fracture Right Distal Tibia
680912	M	2	Right Knee, Shoulder and Ankle Pain
810108	M	5	Fracture Left 1 <sup>st</sup> Distal Phalange
770306	M	2	Right Hip, Shin and Leg Pain
810524	F	6	Left Iliotibial Band Syndrome
720307	M	4	Bilateral Patellar Tendonitis
730224	M	0	Right Ulna Possible Fracture
810907	M	1	Stress Changes Left Mid Tibia
810206	M	2	Mononucleosis
730712	F	5	Right Anterior Cruciate Ligament Tear
790331	M	4	Headaches/Heat
800305	M	6	Left Posterior Tibia Stress Fracture
781227	M	2	Other, urology, Kidney Stones
810227	F	2	Lower Back Pain
751206	M	5	Bilateral Achilles Tendonitis
800807	M	4	Right Medial Knee Pain

760404	M	5	Right Tibia Stress Fracture
770803	M	4	Achilles Tendonitis
790430	M	4	Heat, 2 incidents w/fever over 106 F
790604	M	2	Left Knee Pain
791010	M	2	Bilateral Knee Pain, ITB Pain
750426	M	1	Heat
810112	M	2	Left Upper Tibia Stress Fracture
740113	F	6	Left Ankle Sprain
801022	F	5	Right Foot Stress Fracture
780504	M	5	Right Plantar Fasciitis/Left Metatarsal Pain
780419	M	6	Stress Fracture of Left Distal Tibia
781013	M	3	Left leg Piriformis Syndrome
811024	M	4	Right Fibula and Ankle Fracture
Unkown	F	1	Major Depressive Disorder
720822	M	6	Bilateral Heel Stress Fractures
750627	M	2	Left ITB/Patella Tendonitis
800426	M	4	Right Knee Pain, Possible MCL Strain
800321	M	2	PES Cavus/Bilateral Plantarfasciitis
801014	M	1	Right Proximal Tibial Fracture
781110	F	2	Bilateral Foot Pain
801116	M	3	Syncopal Episode
740608	F	5	Persistent Knee Swelling
790127	M	1	Right Knee Pain, ITP, Hip, Pelvis Pain

760529	M	2	Right Leg Pain/Hardware Retained
Unknown	F	5	fracture of 3 <sup>rd</sup> Metatarsal
790112	M	2	Bilateral Shin Splints
Unknown	F	5	Left Leg Stress Fracture
800706	M	2	Right Toe Fracture
81309	M	6	Two Heat Exhaustion
781125	M	1	Umbilical Hernia
790817	M	2	Right Knee Pain, Right Ankle Pain
750519	M	3	2 <sup>nd</sup> /3 <sup>rd</sup> Metatarealgia Due to Hammer Toes
750603	M	5	Lower Back Injury

Appendix E. Medical Discharge By Major Medical Category for  
Officer Candidate School From October 2000 Through September  
2002.



Appendix F. Medical Workload by International Classification of Disease (ICD-9) Code for Officer Candidate School's Supporting Clinic From October 2000 Through September 2002.

MEPRS	Clinic Name	School	Visits	ICD-9	Description
BARI	Brown Field	OCS	3	186.9	Non-Musculoskeletal
BARI	Brown Field	OCS	2	300	Non-Musculoskeletal
BARI	Brown Field	OCS	1	340	Non-Musculoskeletal
BARI	Brown Field	OCS	5	356.9	Non-Musculoskeletal
BARI	Brown Field	OCS	5	460	Non-Musculoskeletal
BARI	Brown Field	OCS	2	493.92	Non-Musculoskeletal
BARI	Brown Field	OCS	22	680	Non-Musculoskeletal
BARI	Brown Field	OCS	1	715.15	Osteoarthritis, localized, primary, pelvic region & thigh
BARI	Brown Field	OCS	1	715.9	Osteoarthritis, unspecified whether generalized or localized
BARI	Brown Field	OCS	3	715.91	Osteoarthritis, unspecified whether generalized or localized
BARI	Brown Field	OCS	6	716.11	Traumatic arthropathy, shoulder
BARI	Brown Field	OCS	1	716.17	Traumatic arthropathy, ankle/foot
BARI	Brown Field	OCS	4	716.91	Arthropathy, Unspecified
BARI	Brown Field	OCS	5	717.1	Derangement of anterior horn or medial meniscus (knee)
BARI	Brown Field	OCS	14	717.7	Chondromalacia of patella (knee)
BARI	Brown Field	OCS	15	717.83	Old disruption of anterior cruciate ligament (knee)
BARI	Brown Field	OCS	2	718.91	Unspecified derangement of joint
BARI	Brown Field	OCS	2	718.97	Unspecified derangement of joint
BARI	Brown Field	OCS	84	719.4	Pain in joint, Arthralgia
BARI	Brown Field	OCS	3	719.41	Pain in joint, Arthralgia, shoulder
BARI	Brown Field	OCS	3	719.45	Pain in joint, Arthralgia, Pelvic/thigh
BARI	Brown Field	OCS	19	719.46	Pain in joint, Arthralgia, lower leg
BARI	Brown Field	OCS	9	719.47	Pain in joint, Arthralgia, ankle/foot
BARI	Brown Field	OCS	3	719.48	Pain in joint, Arthralgia, other
BARI	Brown Field	OCS	680	719.6	Other symptoms referable to joint
BARI	Brown Field	OCS	1	719.77	Difficulty in walking
BARI	Brown Field	OCS	4	720.2	Sacroiliitis, not elsewhere classified
BARI	Brown Field	OCS	1	721.9	Spondylosis of unspecified site
BARI	Brown Field	OCS	19	722.1	Lumbar intervertebral disc without myelopathy (spine)
BARI	Brown Field	OCS	1	722.52	Lumbar or lumbosacral intervertebral disc (spine)
BARI	Brown Field	OCS	1	722.93	Other & unspecified disc disorder, Lumbar region
BARI	Brown Field	OCS	8	723.4	Other disorders of cervical region, Brachia neuritis or radiculitis NOS
BARI	Brown Field	OCS	1	724.1	Other & unspecified disorders or back, Pain in thoracic spine (spine)
BARI	Brown Field	OCS	11	724.5	Other & unspecified disorders or back, Backache, unspecified (spine)
BARI	Brown Field	OCS	7	726.2	Other affections of the shoulder region, not elsewhere classified

BARI	Brown Field	OCS	2	726.31	Other affections of the shoulder region, not elsewhere classified
BARI	Brown Field	OCS	5	726.32	Enthesopathy of elbow region, lateral epicondylitis
BARI	Brown Field	OCS	5	726.5	Enthesopathy of hip region
BARI	Brown Field	OCS	4	726.64	Enthesopathy of knee, patellar tendinitis
BARI	Brown Field	OCS	1	726.69	Enthesopathy of knee, Other
BARI	Brown Field	OCS	8	726.71	Enthesopathy of ankle and tarsus, Achilles bursitis or tendinitis
BARI	Brown Field	OCS	1	726.72	Enthesopathy of ankle and tarsus, Tibial tendinitis
BARI	Brown Field	OCS	1	727.3	Other bursitis
BARI	Brown Field	OCS	1	727.49	Ganglion and cyst of synovium, tendon, and bursa, Other
BARI	Brown Field	OCS	2	728.3	Other specific muscle disorders
BARI	Brown Field	OCS	2	728.71	Plantar fascial fibromatosis
BARI	Brown Field	OCS	2	728.85	Other disorders of muscle, ligament, and fascia, Spasm of muscle
BARI	Brown Field	OCS	2155	729.5	Pain in limb
BARI	Brown Field	OCS	1	782.1	Non-Musculoskeletal
BARI	Brown Field	OCS	1	808.49	Non-Musculoskeletal
BARI	Brown Field	OCS	2	815	Fracture of metacarpal bone(s), closed, metacarpal bone(s), site unspecified
BARI	Brown Field	OCS	1	816.02	Fractures of one or more phalanges of hand, closed, distal phalanx or phalanges
BARI	Brown Field	OCS	1	820.02	Fracture of neck of femur, Transcervical fracture, closed, Midcervical section
BARI	Brown Field	OCS	1	820.03	Fracture of neck of femur, Transcervical fracture, closed, Base of neck
BARI	Brown Field	OCS	5	820.22	Fracture of neck of femur, Pertrochanteric fracture, closed, subtrochanteric section
BARI	Brown Field	OCS	1	821.01	Fracture of other and unspecified parts of femur, shaft or unspecified parts of femur
BARI	Brown Field	OCS	1	823.01	Fracture of tibia and fibula, upper end, closed, fibula alone
BARI	Brown Field	OCS	1	823.2	Fracture of tibia and fibula, Shaft closed, tibia alone
BARI	Brown Field	OCS	1	823.21	Fracture of tibia and fibula, Shaft, closed, fibula alone
BARI	Brown Field	OCS	4	823.82	Fracture of tibia and fibula, unspecified part, closed, fibula with tibia
BARI	Brown Field	OCS	2	825.2	Fracture of other tarsal and metatarsal bones, closed, Unspecified bone(s) of foot
BARI	Brown Field	OCS	27	825.25	Fracture of other tarsal and metatarsal bones, closed, Metatarsal bone(s)
BARI	Brown Field	OCS	1	831.01	Dislocation of shoulder, closed dislocation, anterior dislocation of humerus
BARI	Brown Field	OCS	3	840.4	Sprains and strains of shoulder and upper arm, Rotator cuff
BARI	Brown Field	OCS	1	840.9	Sprains and strains of shoulder and upper arm, Unspecified site of

BARI	Brown Field	OCS	1	843.1	shoulder and upper arm Sprains and strains of hip and thigh, Ischiocapsular (ligament)
BARI	Brown Field	OCS	4	843.9	Sprains and strains of hip and thigh, Unspecefied site of hip and thigh
BARI	Brown Field	OCS	1	845.01	Sprains and strains of ankle or foot, ankle, Deltoid (ligament), ankle
BARI	Brown Field	OCS	8	845.02	Sprains and strains of ankle or foot, ankle, Calcaneofibular (ligament)
BARI	Brown Field	OCS	3	845.03	Sprains and strains of ankle or foot, ankle, Tibiofibular (ligament), distsal
BARI	Brown Field	OCS	3	850.9	Non-Musculoskeletal
BARI	Brown Field	OCS	1	917.2	Non-Musculoskeletal
BARI	Brown Field	OCS	1	959.3	Non-Musculoskeletal
BARI	Brown Field	OCS	8	0	Unknown
BARI	Brown Field	OCS	32	0	Unknown
BARI	Brown Field	OCS	3	0	Unknown
BARI	Brown Field	OCS	1	0	Unknown
BARI	Brown Field	OCS	21	0	Unknown
BARI	Brown Field	OCS	13	0	Unknown

Appendix G. Medical Workload by International Classification of  
Disease (ICD-9) Code for The Basic School's Supporting Clinic  
From October 2000 Through September 2002.

MEPRS	Clinic Name	School	Visits	ICD-9	Description
BARJ	Ray Hall	TBS	1	239.3	Non-Musculoskeletal
BARJ	Ray Hall	TBS	6	272	Non-Musculoskeletal
BARJ	Ray Hall	TBS	4	272.4	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	296.22	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	300	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	300.02	Non-Musculoskeletal
BARJ	Ray Hall	TBS	6	354	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	372.71	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	380.16	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	382.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	462	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	465.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	472.1	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	479	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	493.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	493.92	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	517.8	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	571.4	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	604.99	Non-Musculoskeletal
BARJ	Ray Hall	TBS	3	607.84	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	681.11	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	684	Non-Musculoskeletal
BARJ	Ray Hall	TBS	5	692.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	696.8	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	715.36	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	716.11	Tramatic arthropathy, shoulder
BARJ	Ray Hall	TBS	2	716.14	Tramatic arthropathy, hand
BARJ	Ray Hall	TBS	1	716.17	Tramatic arthropathy, ankle/foot
BARJ	Ray Hall	TBS	3	716.2	Allergic Arthritis
BARJ	Ray Hall	TBS	5	716.9	Arthropathy, Unspecified
BARJ	Ray Hall	TBS	2	716.91	Arthropathy, Unspecified, shoulder
BARJ	Ray Hall	TBS	1	716.97	Arthropathy, Unspecified, ankle/foot
BARJ	Ray Hall	TBS	31	717.1	Derangement of anterior horn or medial meniscus (knee)
BARJ	Ray Hall	TBS	1	717.3	Other & Unspecified derangement of medial meniscus (knee)
BARJ	Ray Hall	TBS	3	717.4	Derangement of lateral meniscus, unspecified
BARJ	Ray Hall	TBS	47	717.7	Chonromalacia of patella (knee)
BARJ	Ray Hall	TBS	4	717.82	Old disruption of medial

BARJ	Ray Hall	TBS	37	717.83	collateral ligament (knee) Old disruption of anterior cruciate ligament (knee)
BARJ	Ray Hall	TBS	1	717.84	Old disruption of posterior cruciate ligament (knee)
BARJ	Ray Hall	TBS	10	717.89	Capsular ligament of the knee, other
BARJ	Ray Hall	TBS	4	717.9	Unspecified internal derangement of knee
BARJ	Ray Hall	TBS	2	718.01	Articular cartilage disorder, Meniscus
BARJ	Ray Hall	TBS	1	718.21	Pathological dislocation of joint
BARJ	Ray Hall	TBS	1	718.31	Recurrent dislocation, shoulder
BARJ	Ray Hall	TBS	5	718.91	Unspecified derangement of joint
BARJ	Ray Hall	TBS	2	718.97	Unspecified derangement of joint
BARJ	Ray Hall	TBS	125	719.4	Pain in joint, Arthralgia
BARJ	Ray Hall	TBS	13	719.41	Pain in joint, Arthralgia, shoulder
BARJ	Ray Hall	TBS	1	719.43	Pain in joint, Arthralgia, forearm
BARJ	Ray Hall	TBS	3	719.44	Pain in joint, Arthralgia, hand
BARJ	Ray Hall	TBS	10	719.45	Pain in joint, Arthralgia, pelvic/thigh
BARJ	Ray Hall	TBS	83	719.46	Pain in joint, Arthralgia, lower leg
BARJ	Ray Hall	TBS	6	719.47	Pain in joint, Arthralgia, ankle/foot
BARJ	Ray Hall	TBS	3	719.48	Pain in joint, Arthralgia, other
BARJ	Ray Hall	TBS	1	719.49	Pain in joint, Arthralgia
BARJ	Ray Hall	TBS	1	719.77	Difficulty in walking
BARJ	Ray Hall	TBS	1	719.91	Unspecified disorder of joint
BARJ	Ray Hall	TBS	5	720.2	Sacroiliitis, not elsewhere classified
BARJ	Ray Hall	TBS	1	721.9	Spondylosis of unspecified site
BARJ	Ray Hall	TBS	19	722	Displacement of cervical invertebral disc without myelopathy (spine)
BARJ	Ray Hall	TBS	11	722.1	Lumbar invertebral disc without myelopathy (spine)
BARJ	Ray Hall	TBS	1	722.52	Lumbar or lumbosacral invertebral disc (spine)
BARJ	Ray Hall	TBS	1	722.91	Other & unspecified disc disorder, Cervical region
BARJ	Ray Hall	TBS	5	722.93	Other & unspecified disc disorder, Lumbar region
BARJ	Ray Hall	TBS	2	723.4	Other disorders of cervical region, Brachia neuritis or radiculitis NOS

BARJ	Ray Hall	TBS	2	723.9	Other disorders of cervical region, Unspecified musculoskeletal disorders and symptoms referable to neck (neck)
BARJ	Ray Hall	TBS	8	724.1	Other & unspecified disorders or back, Pain in thoracic spine (spine)
BARJ	Ray Hall	TBS	2	724.2	Other & unspecified disorders or back, Lumbar (spine)
BARJ	Ray Hall	TBS	62	724.5	Other & unspecified disorders or back, Backache, unspecified (spine)
BARJ	Ray Hall	TBS	1	724.7	Other & unspecified disorders or back, Disorders of sacrum (spine)
BARJ	Ray Hall	TBS	2	726	Adhesive capsulitis of shoulder
BARJ	Ray Hall	TBS	1	726.1	Disorders of bursae and tendons in shoulder region, unspecified
BARJ	Ray Hall	TBS	1	726.12	Rotator cuff syndrome of shoulder and allied disorders, Bicipital tenosynovitis
BARJ	Ray Hall	TBS	56	726.2	Other affections of the shoulder region, not elsewhere classified
BARJ	Ray Hall	TBS	8	726.2	Other affections of the shoulder region, not elsewhere classified
BARJ	Ray Hall	TBS	1	726.31	Other affections of the shoulder region, not elsewhere classified
BARJ	Ray Hall	TBS	9	726.32	Enthesopathy of elbow region, lateral epicondylitis
BARJ	Ray Hall	TBS	3	726.5	Enthesopathy of hip region
BARJ	Ray Hall	TBS	23	726.64	Enthesopathy of knee, patellar tendinitis
BARJ	Ray Hall	TBS	1	726.65	Enthesopathy of knee, Prepatellar bursitis
BARJ	Ray Hall	TBS	15	726.69	Enthesopathy of knee; Other
BARJ	Ray Hall	TBS	12	726.71	Enthesopathy of ankle and tarsus, Achilles bursitis or tendinitis
BARJ	Ray Hall	TBS	6	726.72	Enthesopathy of ankle and tarsus, Tibial tendinitis
BARJ	Ray Hall	TBS	1	727.03	Other disorders of synovium, tendon, and bursa, Trigger finger (acquired)
BARJ	Ray Hall	TBS	8	727.05	Other disorders of synovium, tendon, and bursa, Other tenosynovitis or hand and wrist

BARJ	Ray Hall	TBS	1	727.3	Other bursitis
BARJ	Ray Hall	TBS	1	727.49	Ganglion and cyst of synovium, tendon, and bursa, Other
BARJ	Ray Hall	TBS	1	727.62	Rupture of tendon, nontraumatic, Tendons of biceps (long head)
BARJ	Ray Hall	TBS	1	727.67	Rupture of tendon, nontraumatic, Achilles tendon
BARJ	Ray Hall	TBS	2	727.9	Unspecified disorder of synovium, tendon, and bursa
BARJ	Ray Hall	TBS	1	728.3	Other specific muscle disorders
BARJ	Ray Hall	TBS	17	728.71	Plantar fascial fibromatosis
BARJ	Ray Hall	TBS	6	728.85	Other disorders of muscle, ligament, and fascia, Spasm of muscle
BARJ	Ray Hall	TBS	1	729.1	Other disorders of soft tissue, Myalgia and myositis, unspecified
BARJ	Ray Hall	TBS	130	729.5	Pain in limb
BARJ	Ray Hall	TBS	1	735.4	Acquired deformities of the toe, Other hammer toe (acquired)
BARJ	Ray Hall	TBS	1	736.2	Other acquired deformities of finger, Unspecified deformity
BARJ	Ray Hall	TBS	1	737	Curvature of the spine, Adolescent postural kyphosis
BARJ	Ray Hall	TBS	1	759.2	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	780.4	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	780.8	Non-Musculoskeletal
BARJ	Ray Hall	TBS	5	785.1	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	785.6	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	799.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	807	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	808.49	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	810.02	Fracture of clavicle, closed
BARJ	Ray Hall	TBS	14	813.21	Fracture of radius and ulna, Shaft, closed
BARJ	Ray Hall	TBS	5	813.42	Fracture of radius and ulna, Lower end, closed
BARJ	Ray Hall	TBS	5	814	Fracture of carpal bone(s), closed, carpal bone, unspecified wrist
BARJ	Ray Hall	TBS	2	814.09	Fracture of carpal bone(s), closed, other
BARJ	Ray Hall	TBS	1	814.19	Fracture of carpal bone(s), open, other
BARJ	Ray Hall	TBS	10	815	Fracture of metacarpal bone(s), closed, metacarpal bone(s), site unspecified
BARJ	Ray Hall	TBS	3	815.01	Fracture of metacarpal bone(s), open, base of thumb (first) metacarpal Bennett's fracture

BARJ	Ray Hall	TBS	3	815.03	Fracture of metacarpal bone(s), open, shaft of metacarpal bone(s)
BARJ	Ray Hall	TBS	2	816	Fractures of one or more phalanges of hand, closed, phalanx or phalanges, unspecefied
BARJ	Ray Hall	TBS	3	816.02	Fractures of one or more phalanges of hand, closed, distal phalanx or phalanges
BARJ	Ray Hall	TBS	1	816.02	Fractures of one or more phalanges of hand, closed, distal phalanx or phalanges
BARJ	Ray Hall	TBS	1	820.02	Fracture of neck of femur, Transcervical frature, closed, Midcervical section
BARJ	Ray Hall	TBS	3	823	Fracture of tibia and fibula, upper end, closed, tibia alone
BARJ	Ray Hall	TBS	5	823.01	Fracture of tibia and fibula, upper end, closed, fibula alone
BARJ	Ray Hall	TBS	5	823.2	Fracture of tibia and fibula, Shaft, closed, tibia alone
BARJ	Ray Hall	TBS	2	823.81	Fracture of tibia and fibula, unspecified part, closed, fibula
BARJ	Ray Hall	TBS	4	823.82	Fracture of tibia and fibula, unspecified part, closed, fibula with tibia
BARJ	Ray Hall	TBS	1	825	Fracture of one or more tarsal and metatarsal bones, fracture of calcaneus, closed
BARJ	Ray Hall	TBS	5	825.25	Fracture of other tarsal and metatarsal bones, closed, Metatarsal bone(s)
BARJ	Ray Hall	TBS	2	826	Fracture of one or more Phalanges of foot, closed
BARJ	Ray Hall	TBS	1	829	Fracture of unspecified bones, closed
BARJ	Ray Hall	TBS	1	831.01	Dislocation of shoulder, closed dislocation, anterior dislocation of humerus
BARJ	Ray Hall	TBS	2	831.04	Dislocation of shoulder, closed dislocation, acromioclavicular (joint)
BARJ	Ray Hall	TBS	1	833.05	Dislocation of wrist, closed, metacarpal (bone), proximal end
BARJ	Ray Hall	TBS	4	836	Dislocation of knee, Tear of medial cartilage or meniscus of knee
BARJ	Ray Hall	TBS	2	836.2	Dislocation of knee, Other tear of cartilage or

BARJ	Ray Hall	TBS	1	839.61	meniscus of knee Other, multiple, and ill-defined dislocations, other location, closed, sternum
BARJ	Ray Hall	TBS	13	840.4	Sprains and strains of shoulder and upper arm, Rotator cuff
BARJ	Ray Hall	TBS	7	840.9	Sprains and strains of shoulder and upper arm, Unspecified site of shoulder and upper arm
BARJ	Ray Hall	TBS	7	841.9	Sprains and strains of elbow and forearm, Unspecified site of elbow and forearm
BARJ	Ray Hall	TBS	1	842.09	Sprains and strains of wrist and hand, wrist, other
BARJ	Ray Hall	TBS	40	843.9	Sprains and strains of hip and thigh, Unspecified site of hip and thigh
BARJ	Ray Hall	TBS	1	844.1	Sprains and strains of knee and leg, Medial collateral ligament of knee
BARJ	Ray Hall	TBS	1	844.8	Sprains and strains of knee eg, Other specified site of and leg
BARJ	Ray Hall	TBS	4	844.9	Sprains and strains of knee and leg, Unspecified site of knee and leg
BARJ	Ray Hall	TBS	5	845	Sprains and strains of ankle or foot, ankle, unspecified site
BARJ	Ray Hall	TBS	13	845.02	Sprains and strains of ankle or foot, ankle, Calcaneofibular (ligament)
BARJ	Ray Hall	TBS	6	845.03	Sprains and strains of ankle or foot, ankle, Tibiofibular (ligament), distal
BARJ	Ray Hall	TBS	4	845.09	Sprains and strains of ankle or foot, ankle, Other
BARJ	Ray Hall	TBS	12	847	Sprains and strains of other and unspecified parts of the back, Neck
BARJ	Ray Hall	TBS	8	847.2	Sprains and strains of other and unspecified parts of the back, Lumbar
BARJ	Ray Hall	TBS	10	848.9	Other and ill-defined sprains and strains, Unspecified site of sprain and strain
BARJ	Ray Hall	TBS	2	850.9	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	923.11	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	924.01	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	924.1	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	928	Non-Musculoskeletal
BARJ	Ray Hall	TBS	4	953.4	Non-Musculoskeletal
BARJ	Ray Hall	TBS	4	953.9	Non-Musculoskeletal

BARJ	Ray Hall	TBS	1	955.2	Non-Musculoskeletal
BARJ	Ray Hall	TBS	3	959.01	Non-Musculoskeletal
BARJ	Ray Hall	TBS	2	959.5	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	959.6	Non-Musculoskeletal
BARJ	Ray Hall	TBS	1	0	Unknown
BARJ	Ray Hall	TBS	11	0	Unknown
BARJ	Ray Hall	TBS	3	0	Unknown
BARJ	Ray Hall	TBS	1	0	Unknown
BARJ	Ray Hall	TBS	1	0	Unknown
BARJ	Ray Hall	TBS	1	0	Unknown
BARJ	Ray Hall	TBS	1	0	Unknown
BARJ	Ray Hall	TBS	75	0	Unknown
BARJ	Ray Hall	TBS	314	0	Unknown
BARJ	Ray Hall	TBS	1	0	Unknown

## Appendix H. Five-Year Business Plan for Model 1, Assuming a 750

Patient Visit Per Month Workload.

Five Year Business Plan						
Volume and Revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Outpatient Volume	9,000.00	9,180.00	9,363.60	9,363.60	9,363.60	9,254.16
Outpatient Revenue (CMAC)	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Total Gross Revenues	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Deduction and Allowances	\$66,150	\$69,497	\$73,014	\$75,204	\$77,460	\$72,265
Net Operating Revenues	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Expenses						
Staff Expenses						
Military Staff	\$191,300	\$198,952	\$206,910	\$215,186	\$223,794	\$207,229
Civilian Staff	\$34,400	\$35,432	\$36,495	\$37,590	\$38,718	\$36,527
Contract Staff	\$255,600	\$263,268	\$271,166	\$279,301	\$287,680	\$271,403
Equipment Costs	\$7,080	\$7,222	\$7,366	\$7,513	\$7,664	\$7,369
Maintenance Costs	\$10,800	\$11,016	\$11,236	\$11,461	\$11,690	\$11,241
Depreciation Costs**	\$11,409	\$11,409	\$11,409	\$11,409	\$11,409	\$11,409
Office Supplies	\$1,440	\$1,469	\$1,498	\$1,528	\$1,559	\$1,499
Publications	\$300	\$306	\$312	\$318	\$325	\$312
Supply Costs	\$480	\$490	\$499	\$509	\$520	\$500
Annual Shipping Costs	\$600	\$612	\$624	\$637	\$649	\$624
Annual Recurring Tech Costs	\$3,000	\$3,060	\$3,121	\$3,184	\$3,247	\$3,124
Professional Training	\$900	\$918	\$936	\$955	\$974	\$937
Utilities						
Computers	\$324	\$337	\$350	\$364	\$379	\$351
Gas Costs	\$3,960	\$4,118	\$4,283	\$4,454	\$4,633	\$4,290
Phone Costs	\$3,840	\$3,994	\$4,153	\$4,319	\$4,492	\$4,160
Electric Costs	\$5,640	\$5,866	\$6,100	\$6,344	\$6,598	\$6,110
Housekeeping Costs	\$12,000	\$12,480	\$12,979	\$13,498	\$14,038	\$12,999
Laundry Costs	\$600	\$624	\$649	\$675	\$702	\$650
LAN Costs	\$3,336	\$3,469	\$3,608	\$3,753	\$3,903	\$3,614
CHCS Contractor Costs	\$1,704	\$1,772	\$1,843	\$1,917	\$1,993	\$1,846
Total Operating Expenses	\$548,713	\$566,813	\$585,541	\$604,918	\$624,967	\$586,190
Net Income (Loss)	\$46,637	\$58,661	\$71,583	\$71,920	\$72,176	\$64,195
Outpatient Cost/encounter	60.97	61.74	62.53	64.60	66.74	
Net Income(Loss)/encounter	5.18	6.39	7.64	7.68	7.71	

Appendix I. Return On Investment and Payback Calculations for  
Model 1, Assuming a 750 Patient Visit Per Month Workload.

Return on Investment and Payback Calculations						
	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Net Operating Revenue	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Net Operating Expenses	\$548,713	\$566,813	\$585,541	\$604,918	\$624,967	\$586,190
Net Income (Loss)	\$46,637	\$58,661	\$71,583	\$71,920	\$72,176	\$64,195
Most Likely Scenario						
Five Year Cumulative Net Income		\$320,977				
Average Net Income		\$64,195				
Investment		\$91,274				
Return on Investment in first year		70.33%				
Return on Investment for 5 years		351.66%				
Years Payback		1.42				
Months Payback		17.06				
Break Even on Initial Investment (Revenue Only)		1,241.82				
Break Even # procedures (Net Income)		13,187.71				

Appendix J. Five-Year Business Plan for Model 2, Assuming a 750  
Patient Visit Per Month Workload.

Five Year Business Plan						
Volume and Revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Outpatient Volume	9,000.00	9,180.00	9,363.60	9,363.60	9,363.60	9,254.16
Outpatient Revenue (CMAC)	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Total Gross Revenues	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Deduction and Allowances	\$66,150	\$69,497	\$73,014	\$75,204	\$77,460	\$72,265
Net Operating Revenues	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Expenses						
Staff Expenses						
Military Staff	\$288,400	\$299,936	\$311,933	\$324,411	\$337,387	\$312,413
Civilian Staff	\$34,400	\$35,432	\$36,495	\$37,590	\$38,718	\$36,527
Contract Staff	\$85,200	\$87,756	\$90,389	\$93,100	\$95,893	\$90,468
Equipment Costs	\$7,080	\$7,222	\$7,366	\$7,513	\$7,664	\$7,369
Maintenance Costs	\$10,800	\$11,016	\$11,236	\$11,461	\$11,690	\$11,241
Depreciation Costs**	\$12,835	\$12,835	\$12,835	\$12,835	\$12,835	\$12,835
Travel Costs	\$4,500	\$4,680	\$4,867	\$5,062	\$5,264	\$4,875
Office Supplies	\$1,440	\$1,469	\$1,498	\$1,528	\$1,559	\$1,499
Publications	\$300	\$306	\$312	\$318	\$325	\$312
Supply Costs	\$480	\$490	\$499	\$509	\$520	\$500
Annual Shipping Costs	\$600	\$612	\$624	\$637	\$649	\$624
Annual Recurring Tech Costs	\$3,000	\$3,060	\$3,121	\$3,184	\$3,247	\$3,127
Professional Training	\$900	\$918	\$936	\$955	\$974	\$937
Utilities						
Computers	\$324	\$337	\$350	\$364	\$379	\$351
Gas Costs	\$3,960	\$4,118	\$4,283	\$4,454	\$4,633	\$4,290
Phone Costs	\$3,840	\$3,994	\$4,153	\$4,319	\$4,492	\$4,160
Electric Costs	\$5,640	\$5,866	\$6,100	\$6,344	\$6,598	\$6,110
Housekeeping Costs	\$12,000	\$12,480	\$12,979	\$13,498	\$14,038	\$12,999
Laundry Costs	\$600	\$624	\$649	\$675	\$702	\$650
LAN Costs	\$3,336	\$3,469	\$3,608	\$3,753	\$3,903	\$3,614
CHCS Contractor Costs	\$1,704	\$1,772	\$1,843	\$1,917	\$1,993	\$1,846
Total Operating Expenses	\$481,339	\$498,391	\$516,080	\$534,429	\$553,463	\$516,740
Net Income (Loss)	\$114,011	\$127,084	\$141,044	\$142,409	\$143,679	\$133,645
Outpatient Cost/encounter	53.48	54.29	55.12	57.08	59.11	
Net Income(Loss)/encounter	12.67	13.84	15.06	15.21	15.34	

Appendix K. Return On Investment and Payback Calculations for  
Model 2, Assuming a 750 Patient Visit Per Month Workload.

Return on Investment and Payback Calculations						
	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Net Operating Revenue	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Net Operating Expenses	\$481,339	\$498,391	\$516,080	\$534,429	\$553,463	\$516,740
Net Income (Loss)	\$114,011	\$127,084	\$141,044	\$142,409	\$143,679	\$133,645
Most Likely Scenario						
Five Year Cumulative Net Income		\$668,226				
Average Net Income		\$133,645				
Investment		\$102,680				
Return on Investment in first year		130%				
Return on Investment for 5 years		651%				
Years Payback		0.77				
Months Payback		9.22				
Break Even on Initial Investment (Revenue Only)		1,397.01				
Break Even # procedures (Net Income)		7,117.94				

## Appendix L. Five-Year Business Plan for Model 3, Assuming a 750

Patient Visit Per Month Workload.

Five Year Business Plan						
Volume and Revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Outpatient Volume	9,000.00	9,180.00	9,363.60	9,363.60	9,363.60	9,254.16
Outpatient Revenue (CMAC)	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Total Gross Revenues	\$661,500	\$694,972	\$730,137	\$752,042	\$774,603	\$722,651
Deduction and Allowances	\$66,150	\$69,497	\$73,014	\$75,204	\$77,460	\$72,265
Net Operating Revenues	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Expenses						
Staff Expenses						
Military Staff	\$225,400	\$234,416	\$243,793	\$253,544	\$263,686	\$244,168
Civilian Staff	\$34,400	\$35,432	\$36,495	\$37,590	\$38,718	\$36,527
Contract Staff	\$85,200	\$87,756	\$90,389	\$93,100	\$95,893	\$90,468
Equipment Costs	\$7,080	\$7,222	\$7,366	\$7,513	\$7,664	\$7,369
Maintenance Costs	\$10,800	\$11,016	\$11,236	\$11,461	\$11,690	\$11,241
Depreciation Costs**	\$12,835	\$12,835	\$12,835	\$12,835	\$12,835	\$12,835
Office Supplies	\$1,440	\$1,469	\$1,498	\$1,528	\$1,559	\$1,499
Publications	\$300	\$306	\$312	\$318	\$325	\$312
Supply Costs	\$480	\$490	\$499	\$509	\$520	\$500
Annual Shipping Costs	\$600	\$612	\$624	\$637	\$649	\$624
Annual Recurring Tech Costs	\$3,000	\$3,060	\$3,121	\$3,184	\$3,247	\$3,127
Professional Training	\$900	\$918	\$936	\$955	\$974	\$937
Utilities						
Computers	\$324	\$337	\$350	\$364	\$379	\$351
Gas Costs	\$3,960	\$4,118	\$4,283	\$4,454	\$4,633	\$4,290
Phone Costs	\$3,840	\$3,994	\$4,153	\$4,319	\$4,492	\$4,160
Electric Costs	\$5,640	\$5,866	\$6,100	\$6,344	\$6,598	\$6,110
Housekeeping Costs	\$12,000	\$12,480	\$12,979	\$13,498	\$14,038	\$12,999
Laundry Costs	\$600	\$624	\$649	\$675	\$702	\$650
LAN Costs	\$3,336	\$3,469	\$3,608	\$3,753	\$3,903	\$3,614
CHCS Contractor Costs	\$1,704	\$1,772	\$1,843	\$1,917	\$1,993	\$1,846
Total Operating Expenses	\$413,839	\$428,191	\$443,072	\$458,500	\$474,498	\$443,620
Net Income (Loss)	\$181,511	\$197,284	\$214,052	\$218,337	\$222,645	\$206,766
Outpatient Cost/encounter	45.98	46.64	47.32	48.97	50.67	48.11
Net Income(Loss)/encounter	20.17	21.49	22.86	23.32	23.78	22.41

\*\*Depreciation Costs are calculated straight line- eight year

Appendix M. Return On Investment and Payback Calculations for

Model 3, Assuming a 750 Patient Visit Per Month Workload.

Return on Investment and Payback Calculations						
	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Net Operating Revenue	\$595,350	\$625,475	\$657,124	\$676,837	\$697,143	\$650,386
Net Operating Expenses	\$413,839	\$428,191	\$443,072	\$458,500	\$474,498	\$443,620
Net Income (Loss)	\$181,511	\$197,284	\$214,052	\$218,337	\$222,645	\$206,766
Most Likely Scenario						
Five Year Cumulative Net Income		\$1,033,828				
Average Net Income		\$206,766				
Investment		\$102,680				
Return on Investment in first year		201%				
Return on Investment for 5 years		1007%				
Years Payback		0.50				
Months Payback		5.96				
Break Even on Initial Investment (Revenue Only)		1397				
Break Even # procedures (Net Income)		4600				

## Appendix N. Five Year Business Plan for Model 4, Assuming a 500

## Patient Visit Per Month Workload

Five Year Business Plan						
Volume and Revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Outpatient Volume	6,000.00	6,120.00	6,242.40	6,242.40	6,242.40	6,169.44
Outpatient Revenue (CMAC)	\$528,000	\$554,717	\$582,785	\$600,269	\$618,277	\$576,810
Total Gross Revenues	\$528,000	\$554,717	\$582,785	\$600,269	\$618,277	\$576,810
Deduction and Allowances	\$52,800	\$55,472	\$58,279	\$60,027	\$61,828	\$57,681
Net Operating Revenues	\$475,200	\$499,245	\$524,507	\$540,242	\$556,449	\$519,129
Expenses						
Staff Expenses						
Military Staff	\$164,000	\$170,560	\$177,382	\$184,478	\$191,357	\$177,655
Equipment Costs	\$7,080	\$7,222	\$7,366	\$7,513	\$7,664	\$7,369
Maintenance Costs	\$10,800	\$11,016	\$11,236	\$11,461	\$11,690	\$11,241
Depreciation Costs**	\$9,157	\$9,157	\$9,157	\$9,157	\$9,157	\$9,157
Travel Costs	\$29,500	\$30,680	\$31,907	\$33,183	\$34,511	\$31,956
Office Supplies	\$1,440	\$1,469	\$1,498	\$1,528	\$1,559	\$1,499
Publications	\$300	\$306	\$312	\$318	\$325	\$312
Supply Costs	\$480	\$490	\$499	\$509	\$520	\$500
Annual Shipping Costs	\$600	\$612	\$624	\$637	\$649	\$624
Annual Recurring Tech Costs	\$3,000	\$3,060	\$3,121	\$3,184	\$3,247	\$3,124
Professional Training	\$900	\$918	\$936	\$955	\$974	\$937
Utilities						
Computers	\$1,272	\$1,323	\$1,376	\$1,431	\$1,488	\$1,378
Gas Costs	\$2,976	\$3,095	\$3,219	\$3,348	\$3,481	\$3,224
Phone Costs	\$2,400	\$2,496	\$2,596	\$2,700	\$2,808	\$2,600
Electric Costs	\$4,752	\$4,942	\$5,140	\$5,345	\$5,559	\$5,148
Housekeeping Costs	\$12,000	\$12,480	\$12,979	\$13,498	\$14,038	\$12,999
Laundry Costs	\$600	\$624	\$649	\$675	\$702	\$650
LAN Costs	\$4,800	\$4,992	\$5,192	\$5,399	\$5,615	\$5,200
CHCS Contractor Costs	\$5,400	\$5,616	\$5,841	\$6,074	\$6,317	\$5,850
Total Operating Expenses	\$261,457	\$271,057	\$281,031	\$291,394	\$302,161	\$281,420
Net Income (Loss)	\$213,743	\$228,188	\$243,476	\$248,848	\$254,288	\$237,709
Outpatient Cost/encounter	\$44	\$44	\$45	\$47	\$48	
Net Income(Loss)/encounter	\$36	\$37	\$39	\$40	\$41	

\*\*Depreciation Costs are calculated straight line- eight year

Appendix O. Return On Investment and Payback Calculations for  
Model 4, Assuming a 500 Patient Visit Per Month Workload.

Return on Investment and Payback Calculations						
	Year 1	Year 2	Year 3	Year 4	Year 5	Five Year Ave
Net Operating Revenue	\$475,200	\$499,245	\$524,507	\$540,242	\$556,449	\$519,129
Net Operating Expenses	\$261,457	\$271,057	\$281,031	\$291,394	\$302,161	\$281,420
Net Income (Loss)	\$213,743	\$228,188	\$243,476	\$248,848	\$254,288	\$237,709
Most Likely Scenario						
Five Year Cumulative Net Income		\$1,188,544				
Average Net Income		\$237,709				
Investment		\$73,254				
Return on Investment in first year		324%				
Return on Investment for 5 years		1622%				
Years Payback		0.31				
Months Payback		3.70				
Break Even on Initial Investment (Revenue Only)		832				
Break Even # procedures (Net Income)		1,903				

Appendix P. Chief, Bureau of Medicine and Surgery letter dated  
June 29, 1990.



DEPARTMENT OF THE NAVY  
BUREAU OF MEDICINE AND SURGERY  
WASHINGTON, D.C. 20372-5120

IN REPLY REFER TO

7100  
Ser 323/OU233139  
29 Jun 90

From: Chief, Bureau of Medicine and Surgery  
To: Commanding Officer, Naval Hospital, San Diego

Subj: RECRUIT INJURY EVALUATION AND TREATMENT TRAINING PROGRAM

Ref: (a) Surgeon General Briefing Re: Orthopedic Rehabilitation  
Units by CAPT M. Taub, MC, USN; CAPT R. Chaney, MC, USN;  
CDR J. Aronen, MC, USN; CDR A. de Savorgnani, NC, USN;  
LCDR C. Bischoff, MC, USN; and LCDR J. Linenger, MC, USN  
of 27 Apr 90

(b) SECNAV Washington DC 132049Z APR 90 (ALNAV 057/90)

1. During reference (a), the establishment of a recruit injury evaluation and treatment training program at Marine Corps Recruit Depot (MCRD) San Diego was discussed, and I am of the opinion that implementation should occur as rapidly as possible. The program will provide a two to four week training rotation in injury evaluation, treatment, and rehabilitation medicine for one to two providers from all recruit training command (RTC)/MCRD clinics on an ongoing basis. Primary goals of the training will be to improve the quality of care for recruits incurring soft tissue/musculoskeletal injuries, to decrease lost training time of recruits due to injuries, and to improve recruit retention.

2. In addition to a training program designed for providers at RTC/MCRD clinics, an ample patient population base is available among active duty personnel in San Diego to provide a two to four week general or continuing medical education program to physicians, physician assistants/students (PAs), and independent duty corpsmen/students (IDCs) in the area of injury evaluation, treatment, and rehabilitation. To meet MCRD San Diego's staffing requirements for a training program, we identified eight civil service positions which you may hire in FY 90 (in addition to five military personnel [one physician, one PA, one physical therapy technician (PT tech), and two corpsmen]) currently responsible for recruit injury and treatment. I will provide you a definition of the civil service positions and funding line for the program. As noted in reference (b), you will need to request from MED-15 hiring waivers for all positions unless you can hire from within the Department of Defense.

BEST AVAILABLE COPY

Subj: RECRUIT INJURY EVALUATION AND TREATMENT TRAINING PROGRAM

Position	GS Rating	Number	Salary
Physician	GM 602-14	2	\$114,108*
PA	GS 603-12	1	40,601
IDC (Hlth Aide)	GS 640-7	2	45,774
PT Tech	GS 633-9	1	28,001
Clerical Asst	GS 303-4/5	2	36,962
Total		8	\$265,445

- \* GMOS will probably be provided a bonus contract depending on their training/experience.

3. I expect initiation of this program to provide existing personnel at RTC/MCRD clinics with instruction in the proper identification and treatment of sports injuries, including pre-entry conditioning measures. I also expect reduced requirements for orthopedic consults, decreased numbers of recruits in rehabilitation companies/platoons, improved data collection and analysis of treatment and prevention issues, improved healthcare provider retention, and a positive perception of medical support by the line and Marine Corps communities. A critical element of the program's success will be stability of teaching staff to ensure a quality learning experience for trainees. At the same time, manning the primary care function of the MCRD clinic must continue to be commensurate with the population served and current quality assurance standards.

4. By copy of this letter, the Health Sciences Education and Training Command will coordinate curriculum review and approval, quality assurance oversight, and other appropriate educational management of subject program.

5. You may reach my point of contact, Commander A. de Savorgnani, NC, USN, MED-323, at (202) 653-0555 or AUTOVON 294-0555.

Copy to:

HSETC

NAVMEDRSCHDEVCOM, Bethesda  
NAVELTHRSCHCEN, San Diego  
HLTHCARE SUPPO, San Diego

JAMES A. ZIMBLE

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Appendix Q. Chief, Bureau of Medicine and Surgery letter dated 100  
February 12, 1992.



DEPARTMENT OF THE NAVY  
OFFICE OF THE SURGEON GENERAL  
NAVY MEDICAL CENTER, WASHINGTON, D.C. 20340

6000  
Ser 311/0045

12 Feb 92

From: Chief, Bureau of Medicine and Surgery  
To: Commanding Officer, Naval Hospital, San Diego

Subj: STAFFING INCREASES TO SUPPORT EXERCISE MEDICINE AND  
REHABILITATIVE CARE AND TRAINING AT BRANCH MEDICAL  
CLINIC MARINE CORPS RECRUIT DEPOT (MCRD), SAN DIEGO

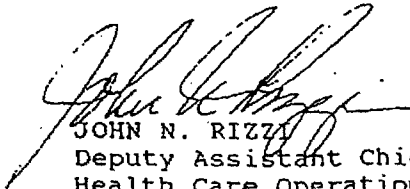
Ref: (a) BRMEDCLINIC MCRD, San Diego memo dated 23 Nov 91

1. Reference (a) described the nature and scope of both the training and care provided by the Exercise Medicine and Rehabilitation Clinic at Branch Medical Clinic (BRMEDCLINIC) MCRD, San Diego. Further, reference (a) articulated additional manpower requirements necessary to expand the training program in response to strong advocacy and demand from line and training commanders.

2. The following billets are being established specifically to support provider training and patient care at the Exercise Medicine and Rehabilitation Clinic, BRMEDCLINIC MCRD, San Diego: General Medical Officer (2); Physician Assistant (2); Independent Duty Corpsman (2), and Physical Therapist (1). Please note that the medical corps billets will be designated "General Medical Officer" until a specific NOBC/Subspecialty code for Exercise and Rehabilitative Medicine can be established through the Chief of Naval Operations (OP-01).

3. Future plans for this specialty include establishment of Exercise Medicine and Rehabilitation billets at medical treatment facilities supporting training and operational missions (RTCs, MARCORPS bases, fleet centers) to help meet the needs of these physically active populations.

4. Point of contact for this matter is Lieutenant J. R. Clark, MSC, USN, MED-311JC, who may be reached at (202) 653-0225 (DSN prefix 294).

  
JOHN N. RIZZO  
Deputy Assistant Chief for  
Health Care Operations

Copy to:  
COMNAVBASE San Diego  
CG, MCRD, San Diego  
HLTHCARE SUPPO, San Diego  
BRMEDCLINIC MCRD, San Diego

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